Stock Returns, Value Decomposition and Macro Variables

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January 15, 2020

ABSTRACT

The aim of this paper is to refine our understanding of the relationship between macroeconomic risk and the value premium. Specifically, we investigate the impact of the macro effect on the fundamental multiples which results from the market-to-book decomposition of Rhodes-Kropf Robinson (2005), and Viswanathan (2005). We find that 10 Year Treasury yield and the slope of Term Structure have a significant impact on several fundamental multiples with a consequential effect on the estimate of firm intrinsic value. Our empirical setup allows us to estimate market-to-book components by using firm fundamental values which are orthogonal to the effects of macroeconomic uncertainty. Our key result is that when we remove the effect of investor's expectations on the economic scenario the value premium rewards, almost entirely, the size risk. Adjusting for the size exposure, orthogonal accounting multiples remove the macro effect reducing the excess return of firm misvaluation.

JEL classification: G12, G14.

1 Introduction

Value investors buy stocks that have low prices relative to book assets and sell stocks that have high prices relative to their fundamental value. These strategies earn high returns that appear anomalous if compared to the results obtained from models such as the CAPM (e.g., Fama and French, 1992). The literature has vividly debated whether these higher returns reflect a behavioral bias or compensation for systematic risk. According to the behavioral hypothesis, investors push up the price of the stocks that have performed well in the recent past, allowing contrarian investors to profit from their overreaction by investing in out-of-favor value stocks (De Bondt and Thaler, 1985). Lakonishok, Shleifer, and Vishny (1994) show that value stocks perform poorly in the past and in the near future. They argue that value strategies exploit the suboptimal behavior of the investors who tend to overreact to firm's past performance and extrapolate past growth too far into the future. Daniel and Titman (2006) state that the value premium is mainly driven by investor's overreaction to intangible information. Under the risk-based explanation, the value premium represents the compensation for the risk embedded in value stocks, relying on the differences in the riskiness of assets in place in relation to growth options (Zhang, 2005), distress risk (Fama and French, 1995 1996) or cash flow uncertainty (Campbell and Vuolteenhao, 2004).

Early attempts to understand the real, macroeconomic, aggregate non-diversifiable risk, which is proxied by returns of value strategies, have been unsuccessful (Lakonishok, Schleifer, and Vishny, 1994). Several authors use macroeconomic variables to directly examine the fact that stock performance determines average returns during economic downturns. Chen, Roll e Ross (1986) use industrial production and inflation among other variables; Cochrane (1996) uses investment growth. Petkova (2006) studies the connection between the Fama-French factors and innovations in state variables such as default spread, dividend-price ratio, yield spread, and short rates. All these authors find out that the average returns line-up against betas, calculated using these macroeconomic indicators. These factors are theoretically easier to motivate, but none explains the value premium as well as the (theoretically less solid, so far) Fama-French asset pricing factors based on size and value (Fama and French, 1993).

The aim of this paper is to refine our understanding of the relationship between the macroeconomic risk and the value premium. We investigate how the investor perception of macroeconomic risk affects the value premium. Our theoretical argument is that in pricing stocks, the investors are influenced by macroeconomic expectations, and this sentiment hits the levels of fundamental multiples on which is based the firm's valuation.

We use the market-to-book decomposition introduced by Rhodes-Kropf Robinson, and Viswanathan (2005)[1] in their work on the timing of merger vawes. This decomposition uses an accounting multiples approach to break market-to-book into market-to-value and value-to-book components, where value is a multiple based estimation of the firm's fundamental value. Golubov and Konstantinidi (2019)[2] are the first in using the RKRV empirical model in the asset pricing field. In their in-

[1] RKRV hereafter.

[2] GK hereafter.

vestigation on risk embedded in the value premium, they show that all of the value premium is concentrated in the market-to-value component while value-to-book has no explanatory power for the cross-section of stock returns. Moreover, they find that differential exposure to cash flow risk, long-run consumption risk, investment-specific technology shocks, operating leverage, and duration do not hold for explaining the excess return of market-to-value component. Instead, they give evidences which are consistent with the behavioral explanations.

Using monthly data from 1975 to 2016, we study size, risk, and returns of each portfolio formed on market-to-book components. Consistently with Golubov and Konstatinidi (2019), we find that the excess return between low and high market-to-book portfolios is almost entirely due to the firm's idiosyncratic misvaluation measured by the firm-specific error component. However, our paper differs from Golubov and Konstatinidi (2019) in two crucial aspects. First, we provide a different perspective based on the macroeconomic risk perception as the crucial factor to explain the excess return of the misvaluation component. Departing from the set of firm-related variables they use to test the risk-based and the behavioral explanations of the value premium, we focus on macroeconomic indicators in the aim to capture the effect of expectations about the entire economic scenario.

Second, this work adds to the existing literature as we center our analysis on the impact of macroeconomic expectations on the firm's intrinsic value for each specific sector. Specifically, we focus on fundamental multiples that result from the market-to-book decomposition to directly dissect the sensitivity of these estimates to the macroeconomic risk perception. Since these multiples contain investor's expectations both on growth and discount rates, their time-varying estimates should capture information on the investor's sentiment about economic perspectives. To explore this relationship, we use macroeconomic variables which are a candidate to affect the expectation component in pricing a stock, namely: the U.S. 10-Year Treasury yield, the slope of Term Structure, the ISM Manufacturing Purchasing Managers Index and the Conference Board Leading Economic Index. We find that the 10-Year Treasury yield and the slope of the Term Structure have a significant impact on several fundamental multiples with a consequential effect on the estimate of the firm's intrinsic value. Our evidence proves that, for several sectors, deviations of the market valuation from its fundamental value are heavily affected by the expectations on the economic cycle captured by these two variables. While previous works only assume that time-varying nature of sector multiples captures discount rates and growth opportunities, we deepen the knowledge on the information contents embedded in this multiples. This result represents a relevant implication for investors in the attempts to relate the firm's market valuation to its fundamental value, especially for investment purposes.

Moreover, we investigate the effect of macroeconomic sentiment on the excess returns of each market-to-book components. We introduce a step further in the exercise of portfolio formation of Golubov and Konstantinidi (2019). This new empirical setup allows us to estimate market-to-book components by using the firm's fundamental values, which are orthogonal to the effects of macroeconomic uncertainty. We evaluate characteristics concerning size, risk, and return of 10 conventional portfolios formed on the new components. Our key empirical result is that when we remove the effect of investor's expectations on the economic scenario, we obtain an extreme allocation of average size over the sorted portfolios. Thus, once we isolate the macroeconomic risk perception of the investor, the value premium rewards, almost entirely, the size risk. More importantly, adjusting for the size exposure, the orthogonal accounting multiples remove the macro effect reducing the excess return of firm-specific error component, which reflects investor mispricing. Therefore, the amount of this reduction measures the portion of misvaluation return, which depends on the investor's perception of macroeconomic risk. This evidence shows how expectations embedded in the intrinsic value affect the predictability characteristics playing a crucial role to price the excess return earned by the misvaluation component.

Overall our results have two relevant implications. First, we provide a complement to the aforementioned literature by identifying and measuring the effect of macroeconomic expectations on the excess return of misvaluation component. On the other hand, our evidence suggests that to use the RKRV decomposition to evaluate the validity of risk-based and behavioral explanations, one should explicitly consider the impact of investor macroeconomic expectation on the firm intrinsic valuation. This paper is organized as follows: Section 2 describes our data sources, sample composition, and variables construction. Section 3 discusses the market-to-book decomposition and related empirical findings. Section 4 introduces the new market-to-book decomposition with a discussion of the main results. Section 5 contains the conclusion with some brief comment.

2 Data

2.1 Firm Data

We use data from two sources. First, we obtain monthly stock returns and shares-outstanding data from the Center for Research in Securities Prices (CRSP) database from January 1975 through December 2016. CRSP includes all firms listed on the New York Stock Exchange (NYSE) since 1925, all firms listed on the American Stock Exchange (AMEX) since 1962, and all firms listed on the NASDAQ since 1972. We take delisting returns from CRSP; if a delisting return is missing we impute a return of -30% (Shumway, 1997).

Second, we intersect accounting data from Standard and Poor's Compustat database over the period 1975-2016, although all our main tests start from 1981 as we require five years of prior data for the market-to-book decomposition. We exclude firm-year observations with SIC codes in the range 6000-6999 (financial firms) because the behavior of earnings and other financial statement numbers for these firms is different. In the merged data set the 1975 to 2016 panel contains 119,403 firm-year observations. We use the 12 Fama-French industry classifications to implement our tests. Table 13 (Appendix) presents details of industry composition using 12 Fama-French industry classification. We use this classification to allow for a sufficient number of firms (minimum of 30) to enter the industry-level cross-sectional regressions required for the market-to-book decomposition. Nevertheless, to check robustness, we experiment with alternative industry classifications and find consistent results (see Section 3.5).

2.2 Macroeconomic Variables

To implement our empirical strategy we select four macroeconomic variables, namely: the US 10-Year Treasury yield, the slope of Term Structure, the ISM Manufacturing Purchasing Managers Index and the Conference Board Leading Economic Index. These variables, well studied in the past literature are good candidate to affect the expectation component included in the pricing process.

The US 10-Year Treasury yield (US10YR) is generally considered as one of the principal indicators in the financial markets. The Treasury yield affects investor confidence reflecting information on several sources of uncertainty, firstly on growth and inflation rates. The expected long-term inflation rate and the expected long-term real growth rate of the economy are the most critical factors that influence the Treasury yield. If bond buyers expect higher inflation or higher real growth, they will expect higher interest rates in the future and thus they will require a higher return on the bonds they buy today. Haubrich and Dombrosky (1996) provide an exhaustive list of explanations to motivate the ability of long-term yields to incorporate economics expectation. However, our sample is characterized by several Monetary Policy interventions, including different waves of Quantitative Easing measures. These events could affect the reliability of the long-term Treasury rate in capturing inflation expectations. In the Section 4.3, we perform some brief robustness checks by using the Inflation measured by the Consumer Price Index (CPI) as a proxy of inflationary pressure.

The slope of the Treasury yield curve has often been cited as a leading economic indicator. Estrella and Hardouvelis (1991) empirically find that the Term Structure (TERM) help predicts future growth in real economic activity, consumption, consumer durables, investments, and the probability of a recession dated by the NBER. Chen (2009) shows that, among the macro variables taken into consideration, Term Structure and Inflation rates are effective predictors of recessions in the US stock market, according to both in-sample and out-of-sample forecasting performance. Specifically, we use the slope of Yield Curve estimated as the difference between the U.S. 10-Year Treasury yield and the U.S. 2-Year Note yield. We depart from the widely used the 10-year minus 3-month formulation because, in our understanding, 2-Year Note yield captures better the expectations on the stream of interventions by the monetary policy[3].

The ISM Manufacturing Purchasing Managers Index (PMI) is based on a monthly survey sent to senior executives at more than 400 companies. It is an essential sentiment reading, not only for manufacturing but also the economy as a whole. Market participants await its release with some anxiety due to its history of destabilizing bond and equity prices on the first business day of each month. Fleming and Remolona (1997) rank the ISM survey seventh in order of importance for trading activity in the Treasury bond market. Ederington and Lee (1996) also report a statistically significant effect of the ISM survey on interest rates in both the U.S. Treasury and the Eurodollar

[3] In the Appendix, we report a more exhaustive discussion on the arguments and pieces of evidence supporting this choice.

market.

Further, the Conference Board Leading Economic Index (LEI) is a composite of multiple indicators covering a broad spectrum of the economy. An increase in the LEI would mean that economic activity is likely to accelerate in the coming months, while a decrease in the LEI would indicate the opposite.

For further details on the macroeconomic variables we have used to implement our empirical strategy see Table 15 in the Appendix

3 Market-to-Book Decomposition

3.1 Related Literature

Studies by Lee, Myers, and Swaminathan (1999) and Dong et al. (2006) suggest that the price-to-value ratio (where value is the firm's fundamental value) is an indicator of mispricing. These studies estimate the intrinsic value of equity using a Residual Income Model, which is based on the analyst's forecasts of future earnings. However, the Residual Income Model relies on a number of fairly restrictive assumptions, and, more importantly, on the use of the analyst's forecasts (to compute residual income), which might represent a shortcoming in terms of reliability. Rhodes-Kropf, Robinson and Viswanathan (2005) relax several assumptions of the residual income model and assume that a firm's intrinsic value is a linear function of its book value of equity, net income (i.e., the growth of book value of equity), and leverage. They develop an empirical methodology that estimates company misvaluation at the firm-level or at the industry-level. Their specification considers a firm's market valuation as a function of its true fundamental value and some market error, explicitly suggesting that market valuations can deviate from the fundamental value. In their empirical paper they argue that merger waves may occur because firms are misvalued and the management exploit inside information to analyze the relative value between target and acquirer. Moreover, the way in which the acquisition is financed, by cash or stocks, can be influenced by this relative valuation.

Recent literature uses the RKRV decomposition technique to examine internal corporate decisions. Lin, Pantzalis, and Park (2010) employ this decomposition as one of several measures of misvaluation in order to prove that better transparency results in more accurate valuation. In a study of private placement and spin-off attempts, Harris and Madura (2011) use the RKRV measure, among others, to provide evidence on the effects of misvaluation in the prediction of the management behavior in cash generating actions. While Hertzel and Li (2010) find evidence that firms initiating seasoned equity offerings (SEOs) underperform following their new issuances, they also find that the firms engaging in SEOs are overvalued as measured by a modified RKRV methodology.

Up to now, the RKRV methodology has been used mostly in the corporate finance literature to explore how valuation-related decisions impact on corporate decisions. Golubov and Konstantinidi (2019) are the first in using the RKRV empirical model, in the asset pricing study, to detect the risk embedded in the value premium. Their misvaluation measure relies on the industry-adjusted pricing of several fundamental variables in measuring the true value of individual stocks and their degrees of misvaluation. They test for the possibility that the industry-level adjustment is not sufficient, and there is a risk not captured, leading to incorrect estimates of the firm's intrinsic value. Under this scenario, variation in the market-to-value components captures risk, and the return predictability of market-to-value represents a risk premium. Alternatively, deviations from estimated fundamental value can reflect relative over-/undervaluation, in which case subsequent returns represent corrections towards fundamental value. They show that all of the value premium is concentrated in the market-to-value component while value-to-book has no explanatory power for the cross-section of stock returns. Moreover, they find that differential exposure to cash flow risk, long-run consumption risk, investment-specific technology shocks, operating leverage, and duration do not hold for explaining the excess return of market-to-value component. Instead, they give evidences which are consistent with the behavioral explanations. Their tests focus on the sensitivity of the excess return of market-to-value and book-to-value components, to identify factors which are unpriced in that firm's intrinsic value. We consider our investigation as complementary to that of Golubov and Konstantinidi.

First, before assessing the ability of the intrinsic value to price any determinants of excess return, we focus directly on its estimate providing evidence on the effect of sector-specific expectations. While previous works only assume that time-varying nature of sector multiples captures discount rates and growth opportunities, we deepen the knowledge on the information contents embedded in this multiples.

Moreover, departing from the set of firm-related variables they use to test the risk-based and the behavioral explanations of the value premium, we focus on macroeconomic indicators in the aim to capture the effect of expectations about the entire economic scenario. Then, we pass to test if expectations embedded in the intrinsic value affect the predictability characteristics of the misevaluation component.

3.2 Decomposing Market-to-Book

We employ Rhodes-Kropf, Robinson and Viswanathan (2005) market-to-book decomposition to divide market-to-book ratio in two components as follows

$$Market/Book = Market/Value \times Value/Book \tag{1}$$

where $Value$ is a measeure of fundamental value. Taking log of market-to-book ratio ($ln(M/B)$) we approximate the above relation by the following algebraic identity

$$m - b = (m - v) + (v - b) \tag{2}$$

where m is the market value, b is the book value, and v is a measure of the fundamental value (we use lowercase letters to denote the values expressed in logs and uppercase letters to denote the same values expressed in standard units). Conceptually the term $m - v$ represents the stock price deviation from the fundamental value, whereas $v - b$ is the difference between fundamental value and book value. If markets perfectly anticipate future cash-flows, discount rates and growth opportunities the term $m-v$ is equal to zero, then this term captures the part of the ratio associated with misvaluation. To estimate v, RKRV express it as a linear function of firm-level accounting characteristics at a point in time, θ_{it}, and a vector of conditional accounting multiples, α. Thus, we can rewrite equation 2 as follows

$$m_{it} - b_{it} = \underbrace{(m_{it} - v(\theta_{it}; \alpha_{jt})}_{\text{firm-specific error}} + \underbrace{v(\theta_{it}; \alpha_{jt}) - v(\theta_{it}; \alpha_j)}_{\text{industry error}} + \underbrace{v(\theta_{it}; \alpha_j) - b_{it}}_{\text{long-run deviation}} \tag{3}$$

The difference in $v(\theta_{it}; .)$ is that α_{jt} represents time-t multiples while α_j are long-run multiples. The first term $m_{it} - v(\theta_{it}; \alpha_{jt})$, referred to as firm-specific error, expresses deviation of market value from fundamental value conditional on time t and industry j. The second term $v(\theta_{it}; \alpha_{jt}) - v(\theta_{it}; \alpha_j)$, referred to as time-series sector-error, represents the deviation of contemporaneous industry valuations from valuations implied by long-run industry multiples. Conceptually it measures the difference in estimated fundamental value when contemporaneous industry accounting multiples at time t, α_{jt}, differ from long-run industry multiples α_j. This difference reflects the extent to which the whole industry (or, possibly, the entire market) may be misvalued at time t. From this perspective $v(\theta_{it}; \alpha_{jt}) - v(\theta_{it}; \alpha_j)$ is the portion of market-to-book that is attributable to deviation of short-run industry multiples from their long-run average values. The final component is the deviation of long-run value from the book value, $v(\theta_{it}; \alpha_j) - b_{it}$. It measures the difference between the firm value implied by the vector of long-run industry multiples and the book value. If the first two terms firm-specific error and time-series sector error encapsulate all market mispricing, then the third term captures the combined value of the firms existing operations and future growth as a function of the book value of its assets in place. Said in other words, it should be an implied market value of the firm, net of any mispricing, relative to book. Hertzel and Li (2010) interpret this term as the firms investment opportunities, which can be viewed as a measure of the firms growth options. Therefore, the multiples used in this component reflect the long-run average growth rates and the discount rates that should apply to the average firm in the industry.

3.3 Estimating Fundamental Value

In order to estimate α multiples we follow Golubov and Konstantinidi (2019) using the specification of the valuation model from RKRV[4]:

$$m_{it} = \alpha_{0jt} + \alpha_{1jt} b_{it} + \alpha_{2jt} ni^{+}_{it} + \alpha_{3jt} I_{<0}(ni^{+}_{it}) + \alpha_{4jt} LEV_{it} + \epsilon_t \tag{4}$$

[4]RKRV (2005) use three different models to estimate $v(\theta_{it}; \alpha_{jt})$ and $v(\theta_{it}; \alpha_j)$. The models differ only with respect to the accounting items that are included in the accounting information vector, θ_{it}.

where m_{it} is the log of market value of equity, b_{it} is the log of book value of common equity, ni^{+} is the log of net income, LEV_{it} is book leverage, and ϵ_t is an error term. An indicator variable $I(<0)$ is interacted with the log of absolute net income (ni^{+}) to separately estimate the earnings multiple for firms with negative net income.[5]

To implement Eq.(4) we group firms according to the 12 Fama-French industries and estimate annual cross-sectional regressions for each industry. Performing industry-year estimations allows to take into account the time-varying nature of growth rates and discount rates embedded in α multiples. To eliminate look-ahead bias, the valuation model is estimated always as of June 30 of each year (i.e. all market values are as of June 30), and we require a three months lag at least for the accounting information to become publicly available. To estimate the long-run industry valuation multiples α_j we average time-series of industry-year multiples over the past five years including the current year (as opposed to the whole sample in RKRV). On this point, we depart from the RKRV (2005), where the full set of coefficients is used to estimate long-run multiples α_j. When the full time-series of industry accounting multiples is used, the time-series industry error and long-run components will contain forward-looking information that is not available to investors at time t and this would undermine the out of sample characteristics of our asset pricing exercise[6].

As a result, the first portfolio formation date is June 1981 and the last one is June 2015; return tracking ends in June 2016. The market-to-book is defined as the market value of the equity at June 30 of each year divided by the book value of the equity that goes into the valuation model.

We estimate $v(\theta_{it};\alpha_{jt})$ using fitted values from Eq.(4) for each firm as follows

$$v(\theta_{it};\hat{\alpha}_{jt}) = \hat{\alpha}_{0jt} + \hat{\alpha}_{1jt}b_{it} + \hat{\alpha}_{2jt}ni^{+}_{it} + \hat{\alpha}_{3jt}I_{<0}(ni^{+}_{it}) + \hat{\alpha}_{4jt}LEV_{it} \tag{5}$$

and then in estimating $v(\theta_{it};\alpha_j)$, we average $1/T\Sigma\hat{\alpha}_{jt} = \bar{\alpha}_j$ for each industry (j), over a 5-year rolling window, then calculate

$$v(\theta_{it};\bar{\alpha}_j) = \bar{\alpha}_{0j} + \bar{\alpha}_{1j}b_{it} + \bar{\alpha}_{2j}ni^{+}_{it} + \bar{\alpha}_{3jt}I_{<0}(ni^{+}_{it}) + \bar{\alpha}_{4j}LEV_{it} \tag{6}$$

The time-series averages of multiples from Eq.(4) are presented in the upper panel of Table 1. The variable $\hat{\alpha_0}$ can be interpreted as the value of intangibles priced into the average firm in a industry at a point in time. It captures the amount of market value attributed to all firms on average, in a given industry at point in time, regardless of their book value, net income and leverage relative to other firms in their industry. Results in Table 1 are consistent with this interpretation; in fact Utilities and Manifacturing have the lowest values of $\hat{\alpha_0}$, while Telephone and TV Trasmission, and Medical have the highest values of intangibles. Intuitively, the values of $\hat{\alpha_1}$ are generally the highest in the same industries in which the constant terms are the lowest, pointing out that in these industries tangible book assets are more highly correlated with the market value.

The loading for positive net income realizations $\hat{\alpha_2}$ is positive and higher in term of magnitude

[5] For further details on construction and descriptive statistics of the variables used in the valuation model, see Table 14 and 15 in the Appendix.

[6] For a more comprehensive discussion on the robustness of this choice see Section 3.5.

than the loading on the absolute value of the negative net income observations, suggesting a weaker effect of negative net income in this pricing formulation. This evidence is supported by also the cross industries low significance level of $\hat{\alpha_3}$. As expected, the loading on leverage $\hat{\alpha_4}$ is negative with an high cross-sectional dispersion, capturing the fact that some industries sustain high-debt loads, while others have an equity tilted capital structure. However the significance of this coefficient is limited compared to other accounting multiples. Finally, the average R^2 values indicate that the valuation model in Eq.(4) explains between 63% and 85% of the market value variation.

Panel (b) of Table 1 reports the descriptive statistics on the output of the decomposition model. The valuation model produces mean firm-specific error of 0.06 with a standard deviation of 0.96; this component has a mean value of zero by construction, as it is the OLS residual from Eq.(4). The average industry error of 0.1 with a standard deviation of $0,4$ while the mean long-run error of $0,54$ with a standard deviation of $0,62$; The firm-specific error exhibits greater variation than industry error, however all three components exhibit meaningful variation. As expected, by construction, the three means add up to the mean of $m_{it} - b_{it}$ of 0.65, with a standard deviation of 1.12.

3.4 Disentangling the excess return in Value Stocks

The econometric specification in Eq.(4) derives from a firm present value formulation of the expected free cash flows on which RKRV impose several identifying restrictions. As stated by Golubov and Konstantinidi (2019), this formulation is particularly useful in order to isolate the effect of risk/growth expectations from the effect of behavioral component; since the discount rates and growth opportunities vary by industry, a within-industry estimation of the α_j multiples strips away such variation and the unexplained part of market value can be more readily interpreted as pure over-/undervaluation.

For the sake of argument, Cohen, Polk and Vuolteenaho (2003) use a log-linear approximation of market-to-book [7] to show that most of the cross-sectional variation in market-to-book is due to differences in future market-to-book and profitability. At the one-year horizon, only 3% of the variation is due to stock returns, thus the value-versus-growth classification contains poor information about future returns. This findings support the decomposition of Eq.(3), in fact if mb_{it} is more sensitive to (contains information about) future profitability and market-to-book, then the component of market-to-book orthogonal to this information is more informative about

[7] They derive an approximation

$$bm_t = \sum_{j-i}^{N} \rho^{j-i} r_{t+j} + \sum_{j-i}^{N} \rho^{j-i}(-e_{t+j}) + \rho^N bm_{t+N} \tag{7}$$

where bm_{it}, is the log book-to-market, r_t is the stock return, e_t is the clean-surplus ROE, and ρ is a linearization factor equal to 1 if firm did not pay dividends or issue or repurchase equity. They assume that earnings, dividends, and book equity series satisfy the clean-surplus relation. In that relation, earnings, dividends, and book equity satisfy

$$BE_t - BE_{t-1} = X_t - D_t \tag{8}$$

book value today BE_t equals book value last year plus clean-surplus ROE (clean-surplus earnings (X_t) less net dividends(X_t)).

expected returns. In this perspective, the α multiples contain time-varying market expectation of discount rates and growth rates, reflecting risk characteristics at the industry level. As a result, the fundamental value $v(\theta_{it};\alpha_{jt})$ should isolate in $m_{it} - v(\theta_{it};\alpha_{jt})$ the orthogonal information mostly related to firm-specific discount rates.

Table 2 reports the average raw monthly returns of 10 conventional portfolios formed on market-to-book and on the three components for the 12 months after portfolio formation. Equally-weighted portfolios are re-balanced annually in July when the valuation model is re-estimated. In the first column of Panel (a) we observe the familiar strong negative relation between market-to-book and average returns. The long-short strategy, that goes long bottom decile portfolio and shorts top decile portfolio, generates a return of 2.35% per month, highly statistically significant. We also report the long-short return using value weighted returns; the corresponding hedge return is 0.88%, also highly significant. The annualized Sharpe ratio of long-short equally weighted portfolios strategy is 1.00. The columns that follow on the right use the three market-to-book components as sorting variables. The second column shows a sharp monotonic decline in returns from low to high firm-specific error portfolios, and a significant long-short return of 3.35% (0.80% value weighted). For this strategy the Sharpe Ratio is 1.37, higher than the market-to-book based strategy.

Sorting portfolios on the industry-error component does not produce a statistically significant excess return. Conversely, portfolios formed on long-run error show an average return increasing in long-run component. The related strategy achieves a negative and statistically significant excess return (-1.94%). These results are consistent with the findings of Hertzel and Li (2010) for post-issue stock price performance.

To address the influence of small stocks on the performance of these strategies, in Panel (b) we sort firms into portfolios based on market-to-book and three components controlling for size. For this purpose we use traditional NYSE breakpoints[8] to avoid size concentrations[9]. Precisely, every June $30th$ we rank stocks on the market capitalization by assigning a decile rank to each firm according to NYSE breakpoints. Next, we define a sub-ranking on the market-to-book components, within each decile. Finally, to form portfolios, we use the sub-ranking to select stocks over the entire size distribution, obtaining 10 sorted portfolios where the constituents are distributed heterogeneously over the size distribution. In the first column the pattern of returns follows that of the conventional market-to-book with average returns decreasing in market-to-book. As in Panel (a) this strategy produces a positive long-short return of 1.31% (0.59% for value weighted portfolios), statically significant. The annualized Sharpe Ratio is 0.65. The second column shows a decline in firm-specific component, whit a significant positive excess return for low firm-specific

[8]Practically, we use the NYSE breakpoints available on the data library of Kennet R. French. The breakpoints for month t use all NYSE stocks that have a CRSP share code of 10 or 11 and have good shares and price data. The breakpoints are calculated for each month by price times shares outstanding (divided by 1.000.000) at month end. The original distribution contains every fifth percentile of market capitalization, from 5% to 100%, we group it further in order to obtain a decile distribution.

[9]The number of "Micro Cap" stocks (market cap less than $300 million) in our sample is on average 56% while their weight makes up to 5%. The variability in market capitalization of these stocks would mean they determine a large number of the portfolio breakpoints when we perform sorts according to CRSP market value. The use of NYSE breakpoints prevents this.

error portfolio (1.84%) over the top-decile portfolio. In this case the strategy has a Sharpe Ratio equal to 0.92. Excess returns for both sector-error and long-run error based strategy are close to zero and statistically insignificant. Therefore, the two-pass sort on market-to-book and size in Panel(b) gives a clearer picture on the separate role of these characteristics in producing excess return. Portfolios formed on the basis of ranked components adjusting for size produce tighter excess returns than those of the portfolio formed on market-to-book components only, dissecting the size premium from the excess return. Consistent with the literature, the value premium is larger in small stocks, though still present in all but Micro Cap deciles (Fama and French, 2008).

However, the central evidence is that the whole return predictability of the market-to-book ratio comes from the firm-specific error component. The second column in Table 2 shows that stocks, whose market value is low relative to estimated fundamental value, exhibit high returns, and viceversa. On the contrary, the value-to-book component that strips out deviations of market value from expected long-run value generates no excess returns. This result supports our expectations regarding the ability of the firm-specific error component to isolate information related to expected returns, being the component that obtains the highest excess return.

3.5 Robustness Checks

The original RKRV methodology uses their full time-series to determine an estimate of the sector-error component. As Hertzel and Li (2010) observe, this introduces a look-ahead bias in the original RKRV specification, because the industry-average valuation would include forward-looking accounting information not available to investors at time t. This inclusion represents a shortcoming for the out-of-sample characteristics of our portfolio construction exercises. Then, following Golubov and Konstantinidi (2019), we use a 5-year rolling average explicitly to avoid look-ahead bias, by utilizing only information available to investors at the time. To maintain the information set consistent with our out-of-sample exercise, we may choose between a fixed rolling window or an expanding rolling window (ranging from the oldest observation to the time-t one) as in Hertzel and Li (2010). We use a fixed dimension because an expanding window could affect the industry value. Practically, an extreme observation would have a more significant impact on the valuation error estimate if there are only two other years, and a smaller impact if there are twenty years averaged together. On the contrary, the use of a window with fixed dimension weights equally each observation.

Nevertheless, the short dimension we use could affect our implementation making industry misvaluation less reliable. As Hertzel and Li (2010) observe, the estimate could be more volatile than if there were ten or twenty years of observations included in the averaging. Then, we compare our long-run multiples with estimates by a 10-year rolling window. We recognize that the 10-year estimates are almost identical to 5-year long-run multiples also concerning volatility, with a correlation approaching 1[10]. Moreover, more extended periods would yield fewer portfolios to examine in our out-of-sample exercise.

[10]For further details on correlation see Table 17 in the Appendix.

However, in order to be aware of the effects deriving from this choice, we test two further versions by using both long-run multiples computed through an expanding rolling window and long-run multiples estimated accordingly to RKRV, over the whole sample. Table 3, shows that the forward-looking information, included in the RKRV specification, lead to a marginal increase of long-short returns for both industry-error and long-run components (in magnitude). On the contrary, results in Panel (b) suggest no evidence about a significant effect on return predictability, from using an expandable rolling window.

Moreover, to further assess the impact due to the potential instability of the 5-year rolling window, we also consider portfolios sorted on the aggregate of sector short-run and long-run errors, $v(\theta_{it};\alpha_j)-b_{it}$. Table 18, in the Appendix, shows performance of portfolios sorted on this component. These results, compared with data of Table 2, provide additional evidence that the use of a short window does not weaken the return predictability abilities of the industry component which, as shown in Table 18, remains poor. Hence, these elements confirm that the choice of a 5-year rolling window does not undermine the evidence deriving from our specification.

Finally, to deal with potential concern on the 12 Fama-French industry classification in capturing differences in corporate valuations, we replicate our predictability results (of Table 2) for level I sectors of Bloomberg Industry Classification System (BICS)[11]. Also in this case we exclude financial firms. In the Appendix, Table 19 presents details of industry composition and Table 20 reports results on the predictability test using BICS classification. We continue to find that the market-to-value component drives all of the return predictability.

4 Market-to-Book Decomposition and Macro Effects

4.1 Macro Effect and Market-to-Book

The hypothesis that macroeconomic affects equity returns have been widely studied and has resulted in an extensive literature regarding the effect of macro variables on stocks returns. The main reason for such interest on this argument is the strong intuitive appeal. According to the main extensions of the market-oriented Capital Asset Pricing Model (Sharpe, 1964 and Lintner, 1965), variables that affect the level of consumption given wealth (Breeden, 1979) or the set of future investment opportunity (Merton, 1973) could be a priced factor in equilibrium. Then, in a risk-averse economy, securities affected by such undiversifiable risk factors should earn a risk premium. Macroeconomic variables are excellent candidates to represent an extra-market risk factor because macro changes simultaneously affect many firm's cash flows and may influence the risk-adjusted discount rate (Flannery and Protopapadakis, 2002).

Despite the theoretical importance of macroeconomic risk factors in explaining the cross-section of the expected asset returns, empirical evidence on the existence of risk premia on macro-factors is

[11]The Bloomberg Industry Classification Systems is a proprietary hierarchical classification system, which classifies firms general business activities. The level I of BICS contains 10 macro sectors, which represent the broadest classification of general business activities.

mixed. In their seminal work Chen, Roll and Ross (1986) find that exposures to five macroeconomic factors, namely industrial production growth, the change in the expected inflation, unexpected inflation, the yield spread between low credit rating and high credit rating bonds, the yield spread between a long-term and a short-term government bond, are priced in cross-section of stock returns. Shanken and Weinstein (2006), however, find that the results of Chen, Roll, and Ross (1986) are not robust to alternative test assets and the way the betas are estimated. In the light of the difficulties of Macro factor-based asset pricing models to explain certain stock return anomalies, several studies attribute the empirical failure to the large measurement errors in macroeconomic factors, the differences between a theoretical definition and its empirical counterpart, or the low frequency in reporting macroeconomic variables (Breeden, Gibbons and Litzenberger, 1989).

However, Bianchi, Guidolin and Ravazzolo (2017) provide reassuring evidence; they find considerable effects from macroeconomic shocks to the cross-section of US stocks returns when risk exposures, as well as idiosyncratic risk, is allowed to be time-varying and to display abrupt change. Furthermore, it's well documented that macroeconomic uncertainty affects fundamental analysis. Lev and Thiagarajan (1993) point out that returns-fundamentals relation is considerably strengthened when it is conditioned on macroeconomic variables. According to their results several fundamentals that appear only weakly value-relevant or even irrelevant in the unconditional analysis exhibit strong association with returns under specific economic conditions.

It's our understanding that stocks represent a claim on the stream of future corporate earnings, discounted back to today using an appropriate discount rate (Cochrane, 2011). This discount rate may be thought of as the return an investor requires from an investment in equity. The fact that market and economic conditions change over time, in response to changing discount rate (Fama and French, 1989), could explain the time variation in long-run returns that we observe historically; for instance, expecting weak economic times, risk-aversion and the cost of capital both increase. In such times, the risk premium required of equities should be expected to increase, thereby driving discount rates up and stock prices down. Thus current valuations, by relating earnings to today's price, can provide insight into what the macroeconomic risk perception embedded in multiples actually is.

Our work departs from the cited literature because we look at the effect of macroeconomic risk perception by investigating the impact that such forces have on discount rates implied in stock's valuation. Our idea is that in pricing stocks the investors are affected by risk perception related to macroeconomic expectations, and this sentiment hits the levels of fundamental multiples on which is based the firm's valuation, because these measures are the expression of discount rates and growth perspectives.

4.2 Dissecting the Macro Effect from Valuation Multiples

Looking at Eq.(4), the α_{1jt} represents the percentage variation we would expect market value (m_{it}) to change if book value (b_{it}) moves by one percent. In this specification the accounting numbers are characterized by a delay with respect to prices, thus, at time t, m_{it} includes already all the information contained in b_{it}. For this reason, α_{1jt} multiple should be significantly affected by the expected growth in the earnings base and by the discount rate which is used to calculate the present value (stock price at time t) of the future stream of earnings. The macroeconomic risk perception should play a crucial role in both earnings forecast and discount rates definition. In particular, since the fundamental multiples are estimated yearly for each sector, they could be compressed or expanded due to expectations of the effect of the economic scenario on the specific sector.

To empirically investigate this argument, we test the effect of macro variable Γ on $\hat{\alpha}_k$ coefficients of Eq.(4)($k = 1, ..., 4$), by running the following set of regressions

$$\begin{aligned}
\hat{\alpha}_{0jt} &= \psi^{\alpha_0} + \gamma^{\alpha_0}\Gamma_t + u_{jt}^{\alpha_0} \\
\hat{\alpha}_{1jt} &= \psi^{\alpha_1} + \gamma^{\alpha_1}\Gamma_t + u_{jt}^{\alpha_1} \\
\hat{\alpha}_{2jt} &= \psi^{\alpha_2} + \gamma^{\alpha_2}\Gamma_t + u_{jt}^{\alpha_2} \\
\hat{\alpha}_{3jt} &= \psi^{\alpha_3} + \gamma^{\alpha_3}\Gamma_t + u_{jt}^{\alpha_3} \\
\hat{\alpha}_{4jt} &= \psi^{\alpha_4} + \gamma^{\alpha_4}\Gamma_t + u_{jt}^{\alpha_4}
\end{aligned} \tag{9}$$

where the subscript k refers to the accounting variables on which the coefficient $\hat{\alpha}_k$ is estimated by Eq.(4); $k = 1$ for book value, 2 for net income, 3 for negative net income, 4 for leverage, and 0 for the constant. Practically, to implement Eq.(9) we group firms according to the 12 Fama-French industries, then within each j industry we perform a time-series regression of each k $\hat{\alpha}_{kjt}$ on macro variable Γ_t.

Then we use $\hat{u}_{jt}^{\alpha_k}$ estimates as orthogonalized coefficients with respect to the macro variable, in order to rewrite Eq.(5) and Eq.(6) as follows:

$$v(\theta_{it}; \hat{u}_{jt}^{\alpha_k}) = \hat{u}_{jt}^{\alpha_0} + \hat{u}_{jt}^{\alpha_1} b_{it} + \hat{u}_{jt}^{\alpha_2} ni_{it}^{+} + \hat{u}_{jt}^{\alpha_3} I_{<0}(ni_{it}^{+}) + \hat{u}_{jt}^{\alpha_4} LEV_{it} \tag{10}$$

obtaining new short-run time-t fundamental values for the firm i. Also in this case, to estimate the orthogonal long-run industry valuation multiples $\bar{u}_{jt}^{\alpha_k}$, we follow the same approach introduced in Section 3 by averaging time-series of industry-year multiples $\hat{u}_{jt}^{\alpha_k}$ over the past five years including the current year.

$$v(\theta_{it}; \bar{u}_{jt}^{\alpha_k}) = \bar{u}_{jt}^{\alpha_0} + \bar{u}_{jt}^{\alpha_1} b_{it} + \bar{u}_{jt}^{\alpha_2} ni_{it}^{+} + \bar{u}_{jt}^{\alpha_3} I_{<0}(ni_{it}^{+}) + \bar{u}_{jt}^{\alpha_4} LEV_{it} \tag{11}$$

Regression in Eq.(9) allows to take into account time-varying nature of growth rates and discount rates embedded in α multiples to extrapolate the effect of macro risk perception. Considering the term $\hat{u}_{jt}^{\alpha_k}$, the residuals represent the portion of $\hat{\alpha}^k$ multiples which is orthogonal to macro variable Γ_t. Thus, by this setup we obtain a valuation model based on a vector $\hat{u}_{jt}^{\alpha_k}$ of conditional accounting multiples from which we removed the macro effect. To test our hypothesis, we select four macro variables, namely: the US 10-Year Treasury yield, the slope of Term Structure, the ISM Manufacturing Purchasing Managers Index and the Conference Board Leading Economic Index.

Panel (a) in Table 4 shows the results from regressing $\hat{\alpha}_k$ on the U.S. 10-Year Treasury yield. The most affected industry is Business Equipment (number 6). For this industry, the level of the US

10-Year yield moves multiples relative to book value ($\hat{\alpha}_1$), net income ($\hat{\alpha}_2$) and leverage ($\hat{\alpha}_4$). Also, the multiples of Consumer Durables (number 2) and Telephone (number 7), in leverage multiple ($\hat{\alpha}_4$), exhibit statistically significant relation with the macro variable. The Treasury yield also hits net income multiple ($\hat{\alpha}_2$) for the Consumer Durables (number 2) and book value multiple ($\hat{\alpha}_1$) for the Telephone (number 7). Intuitively, being these industries the most exposed to the economic cycle, the growth expectations embedded in the 10-Year yield have a widespread impact on the relationship between market value and fundamental value. However, the results in panel (a) show that the leverage is the most rate-sensitive multiple, supporting a meaningful relation with the level of the U.S. Treasury yield. Interestingly, in 2001, the multiple of leverage shows a reversion in all industries with $\hat{\alpha}_4$ tending to positive numbers until the last years of our sample. During this period firms experimented a steady fall in the cost of debt, which coincided with a constant downward movement of the U.S. 10-Year yield. This decline in interest rates improves debt sustainability and interest coverage resulting in a premium for greater leverage. In fact, in this scenario, borrowing at low costs permits leveraged firms to reward shareholder more easily. On the other hand, a high level of the Treasury yield reflects the market expectation of growing inflation and rising interest rates with a consequent increase in the cost of debt, for this reason, the coefficient $\hat{\gamma}^{\alpha_4}$ is negative.

Panel (b) reports the estimates for the slope of Term Structure. Before starting to discuss them, is worth to note that, we have positive and high differentials between 10-year and 2-year yields especially during recessions, when short-term interest rates fall much faster than the longer part of the yield curve, due to the expectations on an intervention of monetary policy[12]. The Chemicals (number 5) and Business Equipment (number 6) industries are more influenced by fluctuations in the yield curve. For these industries, results suggest a negative relation between the slope of Term Structure and net income multiple ($\hat{\alpha}_2$), which reduces when the slope increases. Conceptually, in an economic downturn, the expectation about future earnings are negative with a significant decrease (in terms of magnitude) of $\hat{\alpha}_2$, reducing the loading of net income on market value. Concerning the same industries, the steepness of the yield curve has a positive interaction with the book value multiple ($\hat{\alpha}_1$), which in a recession becomes crucial to identify safer firms with less volatile streams of earnings mostly represented by large cap firms with larger book value. Term Structure's movements have an impact also on the $\hat{\alpha}_0$ with the opposite sign for industries Chemicals (number 5) and Utilities (number 8). In the Chemicals industry, where market value is strongly related to intangible assets by positive and high $\hat{\alpha}_0$, a steep slope reduces this positive relation, resulting in a negative $\hat{\gamma}^{\hat{\alpha}_0}$ coefficient. This evidence is consistent with a slowdown in research and development activity during an economic contraction. The steepness has the opposite sign in the Utility industry where the coefficient $\hat{\gamma}^{\hat{\alpha}_0}$ is positive, signaling an increase for constant term $\hat{\alpha}_0$ in a recession. In the market value of Utility stocks, the price component which is unrelated to fundamentals includes their similarity to bond assets; indeed, firms of this industry are characterized by a defensive nature and by a stable stream of high dividends. These features mean that in a low-rates scenario, the market value is even more independent from accounting fundamentals, causing

[12]In the Appendix, we report a more exhaustive discussion on this argument.

the growth of multiple $\hat{\alpha}_0$. Finally, as in the case of the Treasury Yield, $\hat{\alpha}_4$ is the multiple most affected by the steep of the Yield curve, with a highly positive $\hat{\gamma}^{\hat{\alpha}_4}$. Once the short-term interest rates have been cut by monetary policy intervention, the cost of debt decreases by improving the interest coverage of the leveraged firms, resulting in a reduction of the negative effect on the market value.

Moving to Table 5, Panel (a) summarizes results from regressing $\hat{\alpha}_k$ on ISM Manufacturing PMI suggesting no significant evidences about the effect of this macro indicator on valuation multiples, with the exception of the $\hat{\gamma}^{\hat{\alpha}_3}$ in the Consumer Durables (number 2) and $\hat{\gamma}^{\hat{\alpha}_0}$ in Chemical (number 5). Despite a reading below 50 on the ISM Manufacturing Index suggests a contraction in the manufacturing industry, market participants became aware of all times in which a level below 50 represented a false signal for economic contraction. As a result, the indicator principally provides a confirm or a contradiction to the current macroeconomic sentiment. For this reason, ISM Manufacturing index doesn't present ability in discerning the levels of market sentiment, which could affect multiples. We show a similar result in panel (b) where we report $\hat{\gamma}^{\hat{\alpha}_k}$ coefficients obtained using LEI Indicator as the explanatory variable. In this case, the only industry that exhibits significant evidence is the Oil & Gas (number 4), where a positive change in the LEI index generates an increase in the book value multiple $\hat{\gamma}^{\hat{\alpha}_1}$ and a decline in the constant $\hat{\gamma}^{\hat{\alpha}_0}$.

Although the LEI is often perceived as having the ability to explain the future direction of the markets and the economy, our evidence does not support an effect of the variation of this indicator on the fundamental multiples.

Therefore, our regression-based test confirms our theoretical argument; the US 10-Year Treasury yield and the slope of Term Structure have a significant effect on α coefficients supporting the assumption on the impact of investor's perception of macroeconomic risk. It must be emphasized that this impact is heterogeneous and therefore involves every sector with its own specific sensitivity. Indeed, each sector multiple is influenced differently in terms of sign and magnitude. While previous works only assume that the time-varying nature of sector multiples captures discount rates and growth opportunities we deepen the analysis on the information contents embedded in these multiples. The result extends the knowledge on the information set contained in the RKRV decomposition by proving and evaluating the effect of macroeconomic expectations on each industry-year multiple.

Further, since industry-specific expectations affect α coefficients, this evidence carries a significant implication in the use of the firm's intrinsic value based on these multiples. The following section addresses this question by exploring the consequences of the influence of macroeconomic expectations on the predictive ability of the firm-specific component.

4.3 Robustness Checks

4.3.1 Inflation Measures

Considering variables we have examined in the previous section, in assembling this set we aim to provide a piece of evidence representing both real economic activity and nominal influences of inflation. However, several Monetary Policy interventions (e.g., Quantitative Easing) occurred in our sample could affect inflation expectations captured by the 10-year Treasury yield. On this purpose, we present some brief robustness checks by using the Inflation rate measured by the Consumer Price Index (CPI) as a proxy of the inflationary pressure. We use the 1-year U.S. CPI inflation rate to perform the same regression-based exercise of Eq. (9) in Section 4.2. The inflation measured as the change in the CPI expresses an estimate of realized inflationary pressures but also plays a decisive role in the creation of inflation expectations[13].

Panel (a) in Table 6 shows the results from regressing $\hat{\alpha}_k$ on 1-Year CPI Inflation Rate. The most affected industries are the same where the 10-year Treasury yield has a significant impact. However, the number of industries where the inflation rate significantly affects $\hat{\alpha}_{kjt}$ decreases compared to results for long-term interest rate. The signs and the magnitude of each $\hat{\gamma}^{\alpha_k}$ coefficient are similar to evidence reported in panel (a) of Table 4 for the Treasury yield. This connection is particularly evident for the leverage ($\hat{\alpha}_4$) which is the most affected multiple supporting a meaningful relationship with the level of the inflation rate. In this case, a high level of inflation rate supports the market expectation of growing inflation and rising interest rates with a consequent increase in the cost of debt which in turn means a negative $\hat{\gamma}^{\alpha_4}$, as we discussed for Panel (a) of Table 4. These results lead us to consider the information contents showed in Table 6, as strongly related to findings for the effect of the 10-Year Treasury.

4.3.2 Omitted Information

Finally, we run the regression of Eq.(9) on three macroeconomic factors estimated by Ludvigson and Ng (2009) in their paper on the linkages between forecastable variations in excess bond returns and macroeconomic fundamentals. They use dynamic factor analysis to estimates common factors[14] from an large monthly panel of 132 measures of economic activity[15]. Since these factors can effectively summarize a large amount of information, this further test allows us to check for omitted information problem. In their work, Ludvigson and Ng (2009) estimate 8 common factors and then label them according to the correlation[16] of each factor with a set of macroeconomic variables. Since a small number of factors account for a large fraction of the variance in their panel dataset, we use the first three factors according the largest fraction of the total variation in the data[17]. The

[13] Supporting this argument, the correlation coefficient between 1-year CPI inflation rate and the University of Michigan inflation expectation is 0.91 (and statistically significant with a p-value less than 0.00001) for our sample. The time-series of Michigan inflation expectation are from https://fred.stlouisfed.org/series/MICH.

[14] The dynamic factor model presumes that a few unobserved common factors capture the covariation among economic time-series. Stock and Watson (2002) show that consistent estimates of the space spanned by the common factors can be constructed by the principal component analysis.

[15] The series represent broad categories of macroeconomic time-series: real output and income, employment and hours, real retail, manufacturing and sales data, international trade, consumer spending, housing starts, inventories and inventory sales ratios, orders and unfilled orders, compensation and labor costs, capacity utilization measures, price indexes, interest rates and interest rate spreads, stock market indicators, and foreign exchange measures.

[16] Their labeling is based on the marginal R^2. The marginal R^2 is the R^2 statistic from regressions of each of the 132 individual series in our panel dataset onto each estimated factor, one at a time, using the full sample of data.

[17] Factors are from Sydney C. Ludvigson's data library. For each factor, we calculate the 12-month average. The estimation period for the average starts in June of the previous year.

first factor (F1) loads heavily on measures of employment and production, but also on measures of capacity utilization and new manufacturing orders. Thus they call this a "real factor". The second factor (F2) displays a high correlation with several interest rate spreads. The third factor (F3) is the "inflation factor" as it explains measures of inflation and price pressure showing a high correlation with both commodity prices and consumer prices. The results are reported in Table 7. Panel (a) shows that the real factor (F1) moves multiples of sectors most exposed to business cycle swings as Consumer (1 and 2), Manufacturing (3), Oil (4), Telephone & Television (7) and Utilities (8). The interest rate (F2) and inflation (F3) factors influence equally the same sectors producing the effect of a single common factor. Specifically, these factors have a meaningful impact on Chemical (5) and Residual (12) sectors; indeed Panel(b) and (c) report significant $\bar{\gamma}^{\alpha_k}$ coefficients for almost all $\hat{\alpha}_{kjt}$ in these sectors. Interestingly, Chemical (5) and Residual (12) are the same sectors which result heavly influenced by the 10-year Treasury yield, in Panel (a) of Table 4. This evidence suggests a reasonable equivalence between the joint effect[18] of the interest rate (F2) and inflation (F3) factors and the influence exercised by the nominal level of the 10-year Treasury yield. However, we consider that any labeling of the factors is imperfect because each is influenced to some degree by all the variables in the large dataset [19]. Nonetheless, since these factors capture relevant macroeconomic information, results in Table 6 support us to exclude an omitted information problem.

4.4 Evaluating the Macro Effect on Portfolio Characteristics

In this section, we discuss the effect of macroeconomic expectations on risk-return characteristics of portfolios formed on market-to-book components. Tables below show raw and size-adjusted results in two panels (a) and (b), respectively. Since the size adjustment is based on NYSE breakpoints[20], to evaluate the effect on the characteristics of each portfolio consistently, we need to create a measure which is coherent with the adjustment rules. On this purpose, we formulate the Average Size Index (ASI)[21] which in turn is based on the NYSE breakpoints and ranges from 1 (minimum average size) to 10 (maximum average size).

Table 8 summarizes averages of size, volatility, and beta for firms forming sorted portfolios we have obtained in the first portfolio construction exercise (Section 3). These results represent our reference point to detect shifts in the risk characterization of each portfolio caused by the impact of macro variables (Tables 9 and 10). Then, Column ASI in Table 8 shows the time-series average of the Average Size Index. Columns summarizing the volatility ($\bar{\sigma}$) contain the average of the annual standard deviations of each portfolio constituents. Further, to provide information on the (ex-ante)[22] average market exposure of the portfolios, we collect the average ex-ante beta of each

[18]We have to remember that common factor are orthogonal each other by construction.

[19]Further, the orthogonalization means that no one of them will correspond exactly to a precise economic concept like output or unemployment, which are naturally correlated.

[20]To prevent the "Micro Cap" issue for CRSP universe as discussed in Section 3.

[21]The Average Size Index is calculated as follows: at the portfolios rebalancing date, we rank stocks according to the market capitalization of each firm. Then we label each firm by a number ranging from 1 to 10 based on the NYSE breakpoints. Finally, we calculate the average of the numerical firm labels within each portfolio, obtaining a value for the Average Size Index.

[22]For each firm, we estimate β on CRSP value-weighted index over a five-year rolling window. At the end of June,

portfolio in columns $\bar{\beta}$.

In the first column of Panel (a) we observe a positive relation between market-to-book and the average size, in fact, the value of ASI increases almost monotonically with the market-to-book. As a result, moving to column (2), the differential of average volatility between the Low and the High portfolios is smoothed, even though the market exposure ($\bar{\beta}$) of the first decile portfolio, in column (3), is much lower. Hence, the smaller average size of Low portfolio pushes the average volatility upwards even though the lower average beta. Moving to the firm-specific component in column (4), the relation between average size and firm's volatility is negative and more evident; indeed, portfolios with low average size contain stocks which have higher average volatilities, despite a smaller differential in $\bar{\beta}$. Accordingly, in column (11) the portfolio with the highest $\bar{\sigma}$ is the High long-run portfolio; its constituents have a low average size with high $\bar{\beta}$.

Panel (b) shows results obtained by adding a control for size[23] which produces portfolios with the same medium level for ASI (as showed in columns (1), (4), (7) and (10)). As expected, the high volatility of firms in the Low firm-specific portfolio is mostly attributable to a size effect. In fact, adjusting for size, column (1) shows a positive and almost linear interaction between average volatility and $\bar{\beta}$, for both market-to-book and firm-specific portfolios. Thus, by offsetting the portion of volatility due to tilts in size, we recognize levels of average risk explained primarily by market exposure. Similarly, column (11) shows that firms in the top long-run portfolio become less risky while maintaining the highest average risk, in line with their high market exposure. Interestingly, the evidence of a strong relation between market-to-book and beta, particularly evident for firm-specific and long-run components, persists also controlling for size. This result is consistent with recent work by Ang and Kristensen (2012), according to which the market-to-book strategy has a significantly negative long-run beta.

To explore how dissecting the macro risk perception from multiples affects portfolios performance and risk, we repeat the portfolio construction exercise we have introduced in Section 3, sorting on the market-to-book components. In this case, we calculate market-to-book components by using the empirical setup we have illustrated in Eq.(9) to Eq.(11), where firm's fundamental values are based on $\hat{u}_{jt}^{\alpha_k}$ orthogonal multiples. We run this exercise testing the 10-Year Treasury yield and Term Structure; these variables, according to results in Table 4, have a significant and widespread effect on $\hat{\alpha}_k$ multiples. Tables 9 and 10 contain information on size, volatility, and beta of firms forming portfolios obtained by testing these macroeconomic variables. The first column in Panel (a) exhibits a positive and substantial relation between the firm-specific error and the average size of each sorted portfolio, for both the Treasury Yield and Term Structure. Although this relation has the same sign compared to estimates in column (1) and (4) of Table 8, in this case, the size distribution is highly polarized in the extreme deciles. It results in the minimum average size (ASI approaching 1) for the Low portfolio and average size close to 9 for the High portfolio. Therefore, if we use firm's fundamental values which miss macroeconomic information, sorting firms

we calculate the ex-ante β of each portfolio by averaging βs of the constituents. Column $\bar{\beta}$ reports the time-series average of portfolio-level average β.

[23]Following the same two-pass procedure we have introduced in Section 3, which is based on NYSE breakpoints.

on the principle of deviation from the fundamental value highlights a significant relation between size and misvaluation. We also note that the differential in average beta between the top and bottom firm-specific portfolios disappears compared to the first exercise in Table 8. Indeed, moving to columns (3) in Panel (a), the first and the tenth sorted portfolios are characterized by an equivalent beta. This decline in the Beta Spread is also confirmed for long-run component in column (9) of Tables 9 and 10, although a differential persists. Thus the overall effect is an alignment in market exposures between the top and bottom portfolios. Focusing on the level of average risk, column (2) in Panel (a) shows a result that is similar to Table 8 for the firm-specific component; similarly, the Low portfolio has the highest average risk, while firms forming the High portfolio have the lowest average volatility. However, in this case, the inverse relation between average volatility and the firm-specific component is sharper, with higher differentials in volatility compared to exercise in Table 8. We find a considerable difference in average volatility also in column (8) where the top and bottom long-run portfolios have the highest and the lowest average risk, respectively. On this purpose, the widening in risk differentials is entirely attributable to the extreme distribution of the average size which affects the decile portfolios, as discussed for columns (1) and (7) in Panel(a). Indeed, results of Panel (b) in Table 9 and 10 suggest that by neutralizing size differences, we have a considerable decrease in the volatility spread between High and Low portfolios. Similar to Table 8, by offsetting tilts on the size the average volatility line-up to the dimension of market exposure, consistently with the systemic component of risk. Another consequence of controlling for size is an upward shift in the average beta of each portfolio, suggesting an inverse relation between beta and size. Lastly, there are no pieces of evidence about the effects of the 10-Year Treasury yield and Term Structure on size and risk of portfolios sorted on the industry-error component.

Tables 11 and 12 show performances of portfolios formed on new components obtained by dissecting macro-effect in the market-to-book decomposition. Comparing Panels (a) of Tables 11 and 12 with results in Table 2, we find a higher Low-High return, for firm-specific component. Moving to long-run column, it exhibits the same evidence for the excess return between the top and bottom portfolios; indeed, this differential increases its absolute value. The main reason for this increase is the widening in differential regarding size and average volatility; as illustrated in Tables 9 and 10. Moreover, while in the first exercise (Table 2) capital weighting (vw) considerably reduces the magnitude of Low-High differential return, in this case, the excess return persists to be significant for both firm-specific and long-run components. This persistence is explained by the considerable size dispersion that in this last exercise is approaching the maximum. Thus, also applying a capital-weighting scheme to mitigate the return contribution of small firms, the Low-High return remains considerable, rewarding the sharper differential in the average size. The same explanation is valid for the persistence of Low-High excess return of the long-run component after applying a capital-weighting scheme.

Panels (b) show performances by applying control on size. Offsetting the high differential in average size, we observe a smoothing effect on Low-High return of each market-to-book component. The Low-High return for firm-specific error component decreases from 3.98% to 1.45% in Table 11 and from 4.05% to 1.52% in Table 12, in both cases still maintaining a high level of significance. The excess return between the top and bottom industry-error portfolios, for both macroeconomic variables, reduces marginally, without additions in its poor significance. On the opposite, the Low-High return of long-run component increases considerably from -3.00% to -0.34% and from -4.05% to -0.19% for the Treasury yield and the Term Structure respectively. Interestingly, neutralizing the size effect reduces the significance of the excess return of this component drastically, turning it to be insignificant. This evidence confirms that differences in average size explain entirely the performance of long-run components.

To summarize results in Tables 11 and 12: consistently with the first exercise, only the Low-High return of firm-specific component maintains its significance after removing size effect. However, comparing the Low-High return of firm-specific component in panel (b) with results in Table 2, we observe a decline in return differential. In particular, the return of long-short strategy based on firm-specific component remains significant but reducing to 1.45% (from 3.98%) for the 10-Year Treasury application and to 1.52% (from 4.05%) for the slope of Term Structure. This evidence is crucial since it proves that cleaning alpha multiples from the effect of macroeconomic risk perception reduce the excess return of market-to-book component mostly related to investor mispricing. Therefore, we demonstrate that a considerable portion of premia earned by the misvaluation component rewards expectation on the business cycle embedded in the firm's intrinsic value.

We can outline the key results of this section as follows. The empirical setup of Eq.(9) allows us to estimate time-varying multiples which are orthogonal to information embedded in the macroeconomic variables. As a consequence, the new market-to-book components rely on firm's intrinsic value that ignores the perceived risk on the macroeconomic scenario. The portfolio sorting on these new market-to-book components reveals the substantial correspondence between misvaluation and size. In other words, once we have expunged macro-expectation, deviations from the fundamental value are closely linked to size differential. Conceptually, by erasing sector-specific expectation concerning the economic activity, we show that the premium earned by mispricing component is mostly related to risk in size.

More importantly, if we neutralize the connection between size and misvaluation we obtain two additional crucial results. First, the size-adjusted portfolios formed on firm-specific error exhibit a small differential in market exposure ($\bar{\beta}$) and volatility between low and high portfolios, compared to the first implementation (Table 8). Thus, removing effects of investor's perception of macroeconomic risk and adjusting for size, the firm-specific error is no longer able to evaluate the firm's mispricing also capturing its market exposure, resulting in a smaller differential in beta between undervalued and overvalued firms. Second, the compression of the information set caused by the orthogonal multiples results in a cut of firm-specific excess return. Exactly, the firm-specific error component based on orthogonal multiples miss information on macroeconomic expectation, then the excess return between low and high portfolios is lower. The measure of this reduction represents the portion of the value premium to reward macroeconomic risk perception.

5 Conclusions

We use the market-to-book decomposition of RhodesKropf, Robinson, and Viswanathan (2005) to investigate the effects of macroeconomic risk perception on the value premium. We implement the model specification of Golubov and Konstantinidi (2019), obtaining results in terms of the value premium decomposition, results that are consistent with their findings.

To investigate the impact of macroeconomic effect, we first study the effect that investor's macroeconomic expectations have on the accounting multiples estimated by the decomposition model. We conduct this test by using a set of macroeconomic variables that could affect the expectation component included in the stock pricing process. Our findings show that macroeconomic variables have a significant effect on accounting multiples used to estimate the fundamental value of each firm. More specifically, in our set of variables, those variables that have significant effect are deeply related to the dynamics of interest rates such as the Treasury and Term structures.

Furthermore, in order to assess the effect of macroeconomic expectations on the excess return and risk of each market-to-book components, we introduce a new empirical setup to obtain accounting multiples, which are orthogonalized with respect to the macro effect. We show that, once we isolate the investor's perception of macroeconomic risk, the value premium is strongly related to size risk, rewarding the extreme size allocation resulting on the overall portfolio distribution formed on market-to-book components.

More interestingly, our innovation on the market-to-book decomposition allows us to further dissect the excess return of component mostly related to firm misvaluation, which we show to be dominant in the value premium. We provide evidence that, by adjusting for the size exposure, orthogonal accounting multiples remove the macro effect reducing the excess return of component which is mostly related to the investor mispricing. As a result, the amount of this reduction measures the portion of the value premium that depends on the investor's perception of macroeconomic risk.

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Tables

Table 1

Market-to-book decomposition

The table is based on a sample of 119,403 firm-year observations. Panel (a) reports the estimation results of the valuation model. The regression is estimated annually for each industry from 1976 to 2015. Fama-French 12 industry classifications are reported on the top of the table. The subscripts j, t and i denote industry, year and firm, respectively. The reported coefficients are the time-series averages of the estimated coefficients of each year. Fama-MacBeth p-values are reported in parentheses. Time-series averages of R^2s are reported for each industry. Panel (b) reports the decomposition output.

(a) Firm fundamental multiples

	Fama and French Insustry Classifications										
	1	2	3	4	5	6	7	8	9	10	12
$\hat{\alpha_0}$	1.53	2.02	1.33	1.76	1.78	1.57	2.15	1.30	1.44	1.90	1.93
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.300)	(0.000)	(0.000)	(0.000)
$\hat{\alpha_1}$	0.55	0.47	0.64	0.62	0.48	0.69	0.52	0.6	0.61	0.61	0.55
	(0.000)	(0.000)	(0.000)	(0.000)	(0.050)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
$\hat{\alpha_2}$	0.40	0.35	0.33	0.21	0.46	0.28	0.22	0.30	0.40	0.30	0.34
	(0.000)	(0.080)	(0.000)	(0.100)	(0.030)	(0.000)	(0.160)	(0.060)	(0.000)	(0.010)	(0.000)
$\hat{\alpha_3}$	-0.16	-0.09	-0.11	-0.05	-0.07	-0.10	-0.03	-0.05	-0.17	-0.04	-0.10
	(0.180)	(0.310)	(0.100)	(0.410)	(0.450)	(0.080)	(0.480)	(0.300)	(0.070)	(0.220)	(0.150)
$\hat{\alpha_4}$	0.14	0.09	-0.04	0.44	0.20	-0.09	0.55	0.36	-0.31	0.37	-0.31
	(0.300)	(0.520)	(0.320)	(0.380)	(0.380)	(0.270)	(0.350)	(0.240)	(0.340)	(0.230)	(0.250)
R^2	0.80	0.74	0.85	0.75	0.81	0.82	0.63	0.84	0.83	0.81	0.75

(b) Decomposition output

	Mean	St.dev	1%	5%	25%	Median	75%	95%	99%
$m_{it} - b_{it}$	0.65	1.12	-2.99	-0.93	0.11	0.64	1.23	2.34	3.56
$m_{it} - v(\theta_{it}; \alpha_{jt})$	0.06	0.96	-3.24	-1.52	-0.36	0.13	0.6	1.44	2.2
$v(\theta_{it}; \alpha_{jt}) - v(\theta_{it}; \alpha_j)$	0.10	0.40	-0.88	-0.52	-0.16	0.08	0.34	0.74	1.13
$v(\theta_{it}; \alpha_j) - b_{it}$	0.54	0.62	-1.09	-0.41	0.18	0.53	0.88	1.52	2.18

Table 2

Average monthly returns on portfolios sorted on market-to-book components and size

The table shows average monthly returns for 10 equal-weighted (ew) portfolios formed on the basis of $m_{it} - b_{it}$, $m_{it} - v(\theta_{it}; \alpha_{jt})$, $v(\theta_{it}; \alpha_{jt}) - v(\theta_{it}; \alpha_j)$ and $v(\theta_{it}; \alpha_j) - b_{it}$ for a sample of 119,403 observations over the period 1981-2016. Long/short dollar neutral positions are taken on July 1st of each year in the bottom/top decile of firms sorted as of June $30th$. Value weighted (vw) hedge portfolio returns and annualized Sharpe ratios (for equally weighted strategy) are also reported. The p-value rows report the significance resulting from t tests on the equality of means performed on High and Low average returns by Welch's formula. Panel (b) summarizes average monthly return of portfolios formed on marke-to-book components controlling for size.

(a) Stocks sorted on market-to-book components

Ranking	$m_{it} - b_{it}$	$m_{it} - v(\theta_{it}; \alpha_{jt})$	$v(\theta_{it}; \alpha_{jt}) - v(\theta_{it}; \alpha_j)$	$v(\theta_{it}; \alpha_j) - b_{it}$
Low	2.82%	3.40%	1.66%	0.77%
2	1.85%	1.95%	1.13%	0.88%
3	1.39%	1.50%	1.31%	0.75%
4	1.08%	1.21%	1.25%	0.96%
5	1.01%	1.05%	1.00%	0.84%
6	0.87%	0.83%	1.29%	0.90%
7	0.86%	0.61%	1.06%	1.15%
8	0.75%	0.51%	0.89%	1.14%
9	0.33%	0.31%	0.74%	1.46%
High	0.48%	0.04%	1.16%	2.71%
Low-High (ew)	2.35%	3.35%	0.50%	-1.94%
p-value	0.000	0.000	0.465	0.001
Low-High (vw)	0.88%	0.80%	0.40%	-0.16%
p-value	0.024	0.033	0.365	0.764
Annualized Sharpe Ratio	1.00	1.37	0.08	-0.77

(b) Stocks sorted on market-to-book components adjusting for size

Ranking	$m_{it} - b_{it}$	$m_{it} - v(\theta_{it}; \alpha_{jt})$	$v(\theta_{it}; \alpha_{jt}) - v(\theta_{it}; \alpha_j)$	$v(\theta_{it}; \alpha_j) - b_{it}$
Low	2.03%	2.32%	1.52%	1.05%
2	1.65%	1.73%	1.10%	1.06%
3	1.30%	1.38%	1.05%	0.87%
4	1.11%	1.11%	1.35%	0.91%
5	1.18%	1.10%	1.17%	0.95%
6	0.95%	1.00%	1.22%	1.37%
7	0.92%	0.91%	1.03%	1.06%
8	0.98%	0.84%	0.97%	1.16%
9	0.70%	0.70%	0.89%	1.46%
High	0.72%	0.48%	1.30%	1.77%
Low-High (ew)	1.31%	1.84%	0.22%	-0.71%
p-value	0.010	0.000	0.723	0.161
Low-High (vw)	0.59%	0.58%	0.20%	-0.04%
p-value	0.092	0.131	0.744	0.985
Annualized Sharpe Ratio	0.65	0.92	-0.01	-0.38

Table 3

Average monthly returns on portfolios sorted on the sector-error and the the long-run components: by using alternative averaging methods in the long-run multiples estimation.

The table shows average monthly returns for 10 equal-weighted (ew) portfolios formed on the basis of $m_{it} - b_{it}$, $m_{it} - v(\theta_{it};\alpha_{jt})$,$v(\theta_{it};\alpha_{jt}) - v(\theta_{it};\alpha_j)$ and $v(\theta_{it};\alpha_j) - b_{it}$ for a sample of 119,403 observations over the period 1981-2016.Long/short dollar neutral positions are taken on July 1st of each year in the bottom/top decile of firms sorted as of June $30th$. Value weighted (vw) hedge portfolio returns and annualized Sharpe ratios (for equally weighted strategy) are also reported. The p-value rows report the significance resulting from t tests on the equality of means performed on High and Low average returns by Welch's formula. Panel(a) summarizes average return of portfolios formed by using the whole-sample average to estimate long-run multiples, as in RKRV. Panel(b) reports the average return of portfolios formed by using an expandable rolling window to estimate long-run multiples. Specifically, the expandable rolling window contains 5 observations for the first estimate then adding one more observation for each year.

(a) Portfolio formed on market-to-book components: long-run multiples estimated on the whole sample

	Sorted on market-to-book components		Sorted on market-to-book components adjusting for Size	
Ranking	$v(\theta_{it};\alpha_{jt}) - v(\theta_{it};\alpha_j)$	$v(\theta_{it};\alpha_j) - b_{it}$	$v(\theta_{it};\alpha_{jt}) - v(\theta_{it};\alpha_j)$	$v(\theta_{it};\alpha_j) - b_{it}$
Low	1.92%	0.74%	2.31%	1.81%
2	1.25%	0.75%	1.75%	1.30%
3	1.18%	0.82%	1.36%	1.21%
4	1.13%	0.83%	1.25%	1.10%
5	1.12%	0.78%	1.04%	1.08%
6	1.03%	0.97%	1.01%	0.92%
7	1.01%	0.90%	0.96%	0.91%
8	0.94%	1.10%	0.73%	0.90%
9	1.02%	1.44%	0.69%	1.20%
High	0.99%	3.18%	0.44%	1.17%
Low-High (ew)	0.93%	-2.44%	1.87%	0.63%
p-value	0.061	0.000	0.000	0.137
Low-High (vw)	0.29%	-0.21%	0.63%	0.47%
p-value	0.402	0.601	0.108	0.284
Annualized Sharpe Ratio	0.45	-0.89	0.93	0.37

(b) Portfolio formed on market-to-book components: long-run multiples estimated on a expandable rolling window

	Sorted on market-to-book components		Sorted on market-to-book components and Size	
Ranking	$v(\theta_{it};\alpha_{jt}) - v(\theta_{it};\alpha_j)$	$v(\theta_{it};\alpha_j) - b_{it}$	$v(\theta_{it};\alpha_{jt}) - v(\theta_{it};\alpha_j)$	$v(\theta_{it};\alpha_j) - b_{it}$
Low	1.42%	0.80%	1.37%	0.93%
2	1.26%	0.93%	1.24%	1.07%
3	1.07%	0.72%	1.01%	0.97%
4	1.01%	0.78%	0.97%	0.93%
5	1.17%	0.81%	1.17%	0.96%
6	1.11%	0.74%	0.97%	0.89%
7	1.05%	0.85%	1.00%	0.95%
8	1.08%	1.00%	1.28%	1.66%
9	1.26%	1.97%	1.26%	1.47%
High	1.10%	3.04%	1.31%	1.88%
Low-High (ew)	0.33%	-2.24%	0.06%	-0.95%
p-value	0.540	0.000	0.847	0.051
Low-High (vw)	0.03%	-0.38%	0.48%	0.04%
p-value	0.990	0.323	0.484	0.804
Annualized Sharpe Ratio	0.15	-0.94	0.00	-0.67

Table 4

Estimates of Regression (9) for the U.S. 10-Year Treasury Yield and for the Term Structure

The table shows results from time-series regressions. The left-hand side is the accounting multiple ($\hat{\alpha}_{kjt}$), where k is the accounting fundamental on which the multiple α_k is estimated (k=1 for book value, 2 for net income, 3 for negative net income, 4 for book leverage, 0 for the constant). The subscripts j and t denote industry and year, respectively. The explanatory variable on the right side is the macroeconomic variable Γ_t. The set of univariate regressions in Eq.(9) is performed in each industry j. Specifically, for industry j we run k univariate time-series regressing $\hat{\alpha}_{kjt}$ on macroeconomic variable Γ_t obtaining the slope $\hat{\gamma}^{\alpha_k}$ and the intercept is $\hat{\psi}^{\alpha_k}$. Thus, in industry j (columns) we have a slope and an intercept for each k accounting fundamental (rows). The k regressions are estimated on the whole sample from 1976 to 2015.We request White-corrected standard errors in the presence of heteroskedasticity. The coefficient $\rho(\hat{\alpha}_{kjt}, \Gamma_t)$ is the time-series correlation between the multiple $\hat{\alpha}_{kjt}$ and the macroeconomic variable Γ_t on the whole sample from 1976 to 2015. Panel (a) shows results from testing the U.S. 10-Year Treasury Yield in place to Γ_t; the yield level has been centered around its mean. Panel (b) shows results from running regressions on the slope of Term Structure.

(a) $\hat{\alpha}_{kjt} = \psi^{\alpha_k} + \gamma^{\alpha_k} US10YR_t + u_{jt}^{\alpha_k}$

	Fama-French 12 Industry Classification										
	1	2	3	4	5	6	7	8	9	10	12
$\hat{\gamma}^{\alpha_0}$	-0.07	-0.15	-0.07	-0.08	0.08	0.00	-0.07	-0.13	-0.06	0.02	-0.09
p-value	0.001	0.000	0.001	0.028	0.000	0.828	0.007	0.002	0.001	0.116	0.000
$\hat{\psi}^{\alpha_0}$	1.53	1.98	1.34	1.72	1.79	1.55	2.03	1.37	1.41	1.91	1.83
p-value	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
$\rho(\hat{\alpha}_{0jt}, \Gamma_t)$	-0.49	-0.60	-0.49	-0.37	0.57	0.04	-0.35	-0.54	-0.55	0.23	-0.60
$\hat{\gamma}^{\alpha_1}$	0.01	0.02	0.01	0.01	-0.02	-0.01	0.01	0.01	0.00	0.00	0.01
p-value	0.417	0.002	0.239	0.177	0.055	0.000	0.505	0.484	0.679	0.47	0.018
$\hat{\psi}^{\alpha_1}$	0.55	0.48	0.63	0.62	0.47	0.67	0.53	0.60	0.60	0.61	0.55
p-value	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
$\rho(\hat{\alpha}_{1jt}, \Gamma_t)$	0.14	0.39	0.22	0.17	-0.31	-0.53	0.11	0.14	0.07	-0.12	0.33
$\hat{\gamma}^{\alpha_2}$	0.00	-0.01	-0.01	0.00	0.00	0.01	0.02	0.01	0.00	-0.01	0.00
p-value	0.480	0.337	0.087	0.963	0.991	0.001	0.011	0.324	0.542	0.184	0.504
$\hat{\psi}^{\alpha_2}$	0.41	0.35	0.33	0.21	0.46	0.30	0.25	0.31	0.41	0.30	0.34
p-value	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
$\rho(\hat{\alpha}_{2jt}, \Gamma_t)$	0.11	-0.11	-0.32	-0.01	0.00	0.44	0.39	0.19	-0.10	-0.22	-0.09
$\hat{\gamma}^{\alpha_3}$	0.00	-0.01	-0.01	-0.01	0.00	0.00	-0.02	0.01	-0.02	-0.02	0.01
p-value	0.339	0.071	0.168	0.016	0.583	0.087	0.348	0.028	0.073	0.180	0.000
$\hat{\psi}^{\alpha_3}$	-0.16	-0.09	-0.11	-0.07	-0.07	-0.11	-0.05	-0.05	-0.18	-0.06	-0.09
p-value	0.000	0.000	0.000	0.004	0.021	0.000	0.157	0.010	0.000	0.095	0.000
$\rho(\hat{\alpha}_{3jt}, \Gamma_t)$	0.12	-0.22	-0.24	-0.24	0.05	-0.19	-0.26	0.24	-0.37	-0.27	0.49
$\hat{\gamma}^{\alpha_4}$	-0.15	-0.11	-0.07	-0.04	-0.23	-0.06	-0.12	-0.16	-0.05	-0.17	-0.03
p-value	0.000	0.001	0.000	0.115	0.000	0.037	0.000	0.000	0.025	0.000	0.036
$\hat{\psi}^{\alpha_4}$	0.12	0.11	-0.02	0.41	0.18	-0.13	0.40	0.37	-0.33	0.10	-0.34
p-value	0.099	0.288	0.703	0.000	0.150	0.053	0.000	0.004	0.000	0.206	0.000
$\rho(\hat{\alpha}_{4jt}, \Gamma_t)$	-0.71	-0.49	-0.53	-0.24	-0.69	-0.41	-0.54	-0.56	-0.43	-0.72	-0.32

(b) $\hat{\alpha}_{kjt} = \psi^{\alpha_k} + \gamma^{\alpha_k} TERM_t + u_{jt}^{\alpha_k}$

	Fama-French 12 Industry Classification										
	1	2	3	4	5	6	7	8	9	10	12
$\hat{\gamma}^{\alpha_0}$	0.11	0.18	0.04	0.05	-0.32	-0.04	0.13	0.24	0.11	-0.01	0.15
p-value	0.142	0.216	0.595	0.662	0.000	0.494	0.076	0.049	0.066	0.847	0.049
$\hat{\psi}^{\alpha_0}$	1.42	1.80	1.30	1.66	2.09	1.59	1.91	1.14	1.30	1.92	1.68
p-value	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
$\rho(\hat{\alpha}_{0jt}, \Gamma_t)$	0.23	0.19	0.08	0.07	-0.64	-0.11	0.19	0.27	0.28	-0.03	0.26
$\hat{\gamma}^{\alpha_1}$	-0.01	0.01	0.02	0.00	0.11	0.04	-0.01	-0.03	0.00	0.00	0.00
p-value	0.689	0.702	0.286	0.900	0.000	0.045	0.591	0.423	0.928	0.843	0.801
$\hat{\psi}^{\alpha_1}$	0.56	0.46	0.61	0.62	0.37	0.63	0.54	0.63	0.60	0.61	0.56
p-value	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
$\rho(\hat{\alpha}_{1jt}, \Gamma_t)$	-0.06	0.06	0.17	0.02	0.51	0.37	-0.08	-0.14	0.01	-0.03	-0.04
$\hat{\gamma}^{\alpha_2}$	0.00	-0.05	-0.01	-0.02	-0.06	-0.03	-0.04	0.00	0.00	0.01	-0.01
p-value	0.883	0.065	0.49	0.549	0.046	0.032	0.261	0.937	0.874	0.455	0.629
$\hat{\psi}^{\alpha_2}$	0.41	0.40	0.34	0.23	0.52	0.33	0.29	0.31	0.40	0.29	0.35
p-value	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
$\rho(\hat{\alpha}_{2jt}, \Gamma_t)$	-0.02	-0.28	-0.10	-0.10	-0.29	-0.38	-0.21	-0.01	0.02	0.11	-0.07
$\hat{\gamma}^{\alpha_3}$	-0.03	0.04	0.00	-0.01	0.00	0.00	0.01	-0.05	0.00	0.02	-0.05
p-value	0.032	0.058	0.91	0.749	0.848	0.855	0.710	0.000	0.914	0.696	0.000
$\hat{\psi}^{\alpha_3}$	-0.13	-0.14	-0.11	-0.06	-0.08	-0.11	-0.06	-0.01	-0.18	-0.08	-0.05
p-value	0.000	0.000	0.000	0.062	0.089	0.000	0.000	0.000	0.000	0.384	0.000
$\rho(\hat{\alpha}_{3jt}, \Gamma_t)$	-0.31	0.31	0.02	-0.03	0.02	-0.02	0.05	-0.33	0.02	0.10	-0.58
$\hat{\gamma}^{\alpha_4}$	0.23	0.15	0.07	0.26	0.31	0.06	0.23	0.35	0.01	0.31	0.01
p-value	0.039	0.187	0.388	0.008	0.036	0.501	0.045	0.035	0.832	0.004	0.907
$\hat{\psi}^{\alpha_4}$	-0.09	-0.04	-0.09	0.16	-0.12	-0.19	0.18	0.03	-0.34	-0.20	-0.35
p-value	0.407	0.724	0.290	0.117	0.58	0.094	0.284	0.886	0.000	0.191	0.000
$\rho(\hat{\alpha}_{4jt}, \Gamma_t)$	0.30	0.19	0.14	0.38	0.25	0.12	0.28	0.33	0.03	0.37	0.02

Table 5

Estimates of Regression (9) for ISM Manufacturing Purchasing Managers Index and for Conference Board Leading Economic Indicator

The table shows results from time-series regressions. The left-hand side is the accounting multiple ($\hat{\alpha}_{kjt}$), where k is the accounting fundamental on which the multiple α_k is estimated (k=1 for book value, 2 for net income, 3 for negative net income, 4 for book leverage, 0 for the constant). The subscripts j and t denote industry and year, respectively. The explanatory variable on the right side is the macroeconomic variable Γ_t. The set of univariate regressions in Eq.(9) is performed in each industry j. Specifically, for industry j we run k univariate time-series regressing $\hat{\alpha}_{kjt}$ on macroeconomic variable Γ_t obtaining the slope $\hat{\gamma}^{\alpha_k}$ and the intercept is $\hat{\psi}^{\alpha_k}$. Thus, in industry j (columns) we have a slope and an intercept for each k accounting fundamental (rows). The k regressions are estimated on the whole sample from 1976 to 2015.We request White-corrected standard errors in the presence of heteroskedasticity. The coefficient $\rho(\hat{\alpha}_{kjt}, \Gamma_t)$ is the time-series correlation between the multiple $\hat{\alpha}_{kjt}$ and the macroeconomic variable Γ_t on the whole sample from 1976 to 2015. Panel (a) shows results from testing ISM Manufacturing Purchasing Managers Index in place to Γ_t; the index level has been centered around its mean. Panel (b) shows results from running regressions on the the first difference of Conference Board Leading Economic Indicator.

(a) $\hat{\alpha}_{kjt} = \psi^{\alpha_k} + \gamma^{\alpha_k} PMI_t + u^{\alpha_k}_{jt}$

	Fama-French 12 Industry Classification										
	1	2	3	4	5	6	7	8	9	10	12
$\hat{\gamma}^{\alpha_0}$	-0.01	0.00	-0.02	-0.02	-0.03	-0.01	-0.02	0.00	-0.01	0.00	-0.01
p-value	0.628	0.911	0.08	0.200	0.042	0.639	0.378	0.959	0.454	0.926	0.605
$\hat{\psi}^{\alpha_0}$	1.53	1.98	1.34	1.72	1.79	1.55	2.03	1.37	1.41	1.91	1.83
p-value	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
$\rho(\hat{\alpha}_{0jt}, \Gamma_t)$	-0.07	0.02	-0.23	-0.16	-0.28	-0.08	-0.14	-0.01	-0.11	0.01	-0.10
$\hat{\gamma}^{\alpha_1}$	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.00	0.00	0.00	0.00
p-value	0.48	0.819	0.14	0.812	0.668	0.909	0.204	0.579	0.338	0.247	0.350
$\hat{\psi}^{\alpha_1}$	0.55	0.48	0.63	0.62	0.47	0.67	0.53	0.60	0.60	0.61	0.55
p-value	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
$\rho(\hat{\alpha}_{1jt}, \Gamma_t)$	0.10	0.04	0.19	-0.03	0.07	-0.02	0.18	0.10	0.16	-0.17	0.16
$\hat{\gamma}^{\alpha_2}$	0.00	0.00	0.00	0.00	0.00	0.00	-0.01	0.00	0.00	0.00	0.00
p-value	0.893	0.628	0.494	0.517	0.86	0.686	0.21	0.566	0.931	0.235	0.9
$\hat{\psi}^{\alpha_2}$	0.41	0.35	0.33	0.21	0.46	0.30	0.25	0.31	0.41	0.30	0.34
p-value	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
$\rho(\hat{\alpha}_{2jt}, \Gamma_t)$	-0.02	-0.07	-0.09	0.10	0.03	0.05	-0.19	-0.12	-0.02	0.22	-0.02
$\hat{\gamma}^{\alpha_3}$	0.00	0.01	0.00	-0.01	0.00	0.00	0.01	0.00	0.00	0.02	0.00
p-value	0.604	0.051	0.721	0.289	0.702	0.167	0.433	0.273	0.66	0.109	0.179
$\hat{\psi}^{\alpha_3}$	-0.16	-0.09	-0.11	-0.07	-0.07	-0.11	-0.05	-0.05	-0.18	-0.06	-0.09
p-value	0.000	0.000	0.000	0.004	0.021	0.000	0.154	0.012	0.000	0.09	0.000
$\rho(\hat{\alpha}_{3jt}, \Gamma_t)$	-0.06	0.23	-0.08	-0.22	0.07	-0.20	0.28	-0.15	0.13	0.32	-0.24
$\hat{\gamma}^{\alpha_4}$	-0.01	-0.02	0.01	0.00	0.04	-0.01	0.00	0.00	-0.02	0.01	-0.02
p-value	0.797	0.285	0.339	0.792	0.239	0.415	0.993	0.979	0.124	0.854	0.219
$\hat{\psi}^{\alpha_4}$	0.12	0.11	-0.02	0.41	0.18	-0.13	0.40	0.37	-0.33	0.10	-0.34
p-value	0.238	0.348	0.745	0.000	0.29	0.074	0.001	0.015	0.000	0.376	0.000
$\rho(\hat{\alpha}_{4jt}, \Gamma_t)$	-0.04	-0.14	0.12	-0.04	0.16	-0.14	0.00	0.00	-0.23	0.03	-0.22

(b) $\hat{\alpha}_{kjt} = \psi^{\alpha_k} + \gamma^{\alpha_k} LEI_t + u^{\alpha_k}_{jt}$

	Fama-French 12 Industry Classification										
	1	2	3	4	5	6	7	8	9	10	12
$\hat{\gamma}^{\alpha_0}$	-0.01	0.00	-0.02	-0.06	-0.02	0.01	-0.01	-0.02	0.00	0.00	-0.01
p-value	0.524	0.916	0.204	0.016	0.218	0.519	0.753	0.407	0.941	0.684	0.504
$\hat{\psi}^{\alpha_0}$	1.57	2.00	1.38	1.79	1.80	1.55	2.08	1.40	1.42	1.91	1.87
p-value	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
$\rho(\hat{\alpha}_{0jt}, \Gamma_t)$	-0.11	0.02	-0.17	-0.36	-0.21	0.08	-0.04	-0.14	-0.01	0.05	-0.12
$\hat{\gamma}^{\alpha_1}$	0.00	0.00	0.00	0.01	0.01	0.00	0.00	0.01	0.00	0.00	0.00
p-value	0.368	0.951	0.468	0.042	0.328	0.621	0.876	0.271	0.384	0.624	0.356
$\hat{\psi}^{\alpha_1}$	0.54	0.48	0.63	0.62	0.47	0.67	0.52	0.59	0.60	0.61	0.55
p-value	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
$\rho(\hat{\alpha}_{1jt}, \Gamma_t)$	0.11	-0.01	0.08	0.26	0.14	-0.07	0.02	0.19	0.11	-0.06	0.15
$\hat{\gamma}^{\alpha_2}$	0.00	0.00	0.00	-0.01	0.00	0.00	0.00	-0.01	0.00	0.00	0.00
p-value	0.683	0.833	0.952	0.078	0.308	0.802	0.756	0.231	0.753	0.779	0.464
$\hat{\psi}^{\alpha_2}$	0.41	0.34	0.33	0.21	0.46	0.29	0.25	0.31	0.40	0.29	0.34
p-value	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
$\rho(\hat{\alpha}_{2jt}, \Gamma_t)$	-0.05	-0.03	-0.01	-0.20	-0.11	-0.03	-0.05	-0.20	-0.04	0.04	-0.10
$\hat{\gamma}^{\alpha_3}$	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.00
p-value	0.729	0.034	0.795	0.462	0.327	0.788	0.527	0.358	0.627	0.386	0.634
$\hat{\psi}^{\alpha_3}$	-0.15	-0.10	-0.11	-0.06	-0.08	-0.10	-0.05	-0.04	-0.18	-0.06	-0.09
p-value	0.000	0.000	0.000	0.008	0.009	0.000	0.198	0.014	0.000	0.186	0.000
$\rho(\hat{\alpha}_{3jt}, \Gamma_t)$	0.04	0.25	0.03	-0.08	0.10	0.03	0.09	-0.15	0.06	0.16	-0.09
$\hat{\gamma}^{\alpha_4}$	-0.01	-0.03	0.01	0.01	0.03	-0.02	0.00	0.02	-0.02	-0.01	-0.01
p-value	0.699	0.301	0.573	0.624	0.489	0.295	0.901	0.493	0.110	0.857	0.422
$\hat{\psi}^{\alpha_4}$	0.15	0.17	-0.02	0.41	0.17	-0.11	0.42	0.39	-0.30	0.14	-0.33
p-value	0.167	0.167	0.788	0.000	0.329	0.175	0.001	0.008	0.000	0.269	0.000
$\rho(\hat{\alpha}_{4jt}, \Gamma_t)$	-0.06	-0.20	0.09	0.07	0.12	-0.15	0.02	0.08	-0.24	-0.03	-0.15

Table 6

Estimates of Regression (9) for U.S. CPI Inflation Rate

The table shows results from time-series regressions. The left-hand side is the accounting multiple ($\hat{\alpha}_{kjt}$), where k is the accounting fundamental on which the multiple α_k is estimated (k=1 for book value, 2 for net income, 3 for negative net income, 4 for book leverage, 0 for the constant). The subscripts j and t denote industry and year, respectively. The explanatory variable on the right side is the macroeconomic variable Γ_t. The set of univariate regressions in Eq.(9) is performed in each industry j. Specifically, for industry j we run k univariate time-series regressing $\hat{\alpha}_{kjt}$ on macroeconomic variable Γ_t obtaining the slope $\hat{\gamma}^{\alpha_k}$ and the intercept is $\hat{\psi}^{\alpha_k}$. Thus, in industry j (columns) we have a slope and an intercept for each k accounting fundamental (rows). The k regressions are estimated on the whole sample from 1976 to 2015.We request White-corrected standard errors in the presence of heteroskedasticity. The coefficient $\rho(\hat{\alpha}_{kjt}, \Gamma_t)$ is the time-series correlation between the multiple $\hat{\alpha}_{kjt}$ and the macroeconomic variable Γ_t on the whole sample from 1976 to 2015. Panel (a) shows results from testing 1-year U.S. CPI inflation rate in place to Γ_t; the yield level has been centered around its mean.

(a) $\hat{\alpha}_{kjt} = \psi^{\alpha_k} + \gamma^{\alpha_k} CPIYOY_t + u^{\alpha_k}_{jt}$

	Fama-French 12 Industry Classification										
	1	2	3	4	5	6	7	8	9	10	12
$\bar{\gamma}^{\alpha_0}$	-0.07	-0.13	-0.05	-0.02	0.10	-0.03	-0.10	-0.05	-0.04	-0.02	-0.08
p-value	0.000	0.000	0.008	0.534	0.000	0.063	0.000	0.109	0.023	0.136	0.000
$\bar{\psi}^{\alpha_0}$	1.44	1.92	1.22	1.60	1.62	1.50	2.03	1.35	1.22	1.84	1.70
p-value	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
$\rho(\hat{\alpha}_{0jt}, \Gamma_t)$	-0.51	-0.45	-0.35	-0.08	0.53	-0.28	-0.57	-0.21	-0.35	-0.24	-0.50
$\rho(\hat{u}^{\alpha_0}_{jt}, \Gamma_t)$	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
$\bar{\gamma}^{\alpha_1}$	-0.01	0.01	-0.01	0.00	-0.05	-0.01	0.00	-0.02	-0.01	0.00	0.00
p-value	0.331	0.567	0.079	0.845	0.008	0.079	0.938	0.076	0.104	0.917	0.316
$\bar{\psi}^{\alpha_1}$	0.59	0.50	0.67	0.69	0.54	0.69	0.58	0.64	0.64	0.63	0.58
p-value	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
$\rho(\hat{\alpha}_{1jt}, \Gamma_t)$	-0.15	0.09	-0.23	0.03	-0.74	-0.42	-0.01	-0.33	-0.42	0.02	-0.17
$\rho(\hat{u}^{\alpha_1}_{jt}, \Gamma_t)$	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
$\bar{\gamma}^{\alpha_2}$	0.01	0.01	0.00	0.00	0.03	0.01	0.02	0.04	0.01	-0.01	0.01
p-value	0.015	0.129	0.38	0.789	0.094	0.078	(0	0.123	0.155	0.277	0.087
$\bar{\psi}^{\alpha_2}$	0.37	0.32	0.30	0.15	0.41	0.28	0.21	0.27	0.37	0.28	0.31
p-value	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
$\rho(\hat{\alpha}_{2jt}, \Gamma_t)$	0.33	0.21	0.12	-0.05	0.53	0.53	0.43	0.49	0.38	-0.34	0.47
$\rho(\hat{u}^{\alpha_2}_{jt}, \Gamma_t)$	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
$\bar{\gamma}^{\alpha_3}$	-0.01	-0.02	-0.01	-0.01	0.00	-0.01	0.00	0.01	-0.02	-0.02	0.01
p-value	0.151	0.091	0.336	0.229	0.746	0.156	0.695	0.019	0.064	0.545	0.000
$\bar{\psi}^{\alpha_3}$	-0.15	-0.10	-0.11	-0.04	-0.07	-0.11	-0.03	-0.04	-0.18	-0.05	-0.10
p-value	0.000	0.000	0.000	0.005	0.000	0.000	0.386	0.004	0.000	0.132	0.000
$\rho(\hat{\alpha}_{3jt}, \Gamma_t)$	-0.17	-0.39	-0.25	-0.25	-0.06	-0.59	-0.06	0.36	-0.36	-0.27	0.62
$\rho(\hat{u}^{\alpha_3}_{jt}, \Gamma_t)$	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
$\bar{\gamma}^{\alpha_4}$	-0.01	-0.01	0.00	-0.01	-0.05	0.00	-0.01	-0.01	0.00	-0.02	-0.01
p-value	0.05	0.001	0.292	0.054	0.000	0.564	0.013	0.053	0.105	0.000	0.004
$\bar{\psi}^{\alpha_4}$	0.03	0.04	0.03	0.07	0.02	0.03	0.01	0.04	0.03	0.02	0.01
p-value	0.151	0.000	0.000	0.000	0.191	0.000	0.199	0.006	0.000	0.031	0.017
$\rho(\hat{\alpha}_{4jt}, \Gamma_t)$	-0.30	-0.43	-0.22	-0.38	-0.74	-0.12	-0.40	-0.47	-0.21	-0.67	-0.59
$\rho(\hat{u}^{\alpha_4}_{jt}, \Gamma_t)$	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

Table 7

Estimates of Regression (9) for Macroeconomic Common Factors

The table shows results from time-series regressions. The left-hand side is the accounting multiple ($\hat{\alpha}_{kjt}$), where k is the accounting fundamental on which the multiple α_k is estimated (k=1 for book value, 2 for net income, 3 for negative net income, 4 for book leverage, 0 for the constant). The subscripts j and t denote industry and year, respectively. The explanatory variable on the right side is the macroeconomic variable Γ_t. The set of univariate regressions in Eq.(9) is performed in each industry j. Specifically, for industry j we run k univariate time-series regressing $\hat{\alpha}_{kjt}$ on macroeconomic variable Γ_t obtaining the slope $\hat{\gamma}^{\alpha_k}$ and the intercept is $\hat{\psi}^{\alpha_k}$. Thus, in industry j (columns) we have a slope and an intercept for each k accounting fundamental (rows). The k regressions are estimated on the whole sample from 1976 to 2015.We request White-corrected standard errors in the presence of heteroskedasticity. The coefficient $\rho(\hat{\alpha}_{kjt}, \Gamma_t)$ is the time-series correlation between the multiple $\hat{\alpha}_{kjt}$ and the macroeconomic variable Γ_t on the whole sample from 1976 to 2015. Panel (a), (b) and (c) show results from testing F1, F2, and F3 common factors, respectively.

(a) $\hat{\alpha}_{kjt} = \psi^{\alpha_k} + \gamma^{\alpha_k} F1_t + u_{jt}^{\alpha_k}$

	Fama-French 12 Industry Classification										
	1	2	3	4	5	6	7	8	9	10	12
$\bar{\gamma}^{\alpha_0}$	0.44	0.25	0.47	0.80	-0.09	0.04	0.71	0.73	0.26	-0.03	0.53
p-value	0.046	0.626	0.006	0.018	0.671	0.845	0.03	0.016	0.123	0.794	0.07
$\bar{\psi}^{\alpha_0}$	1.38	1.85	1.16	1.58	1.65	1.46	1.91	1.30	1.20	1.83	1.62
p-value	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
$\bar{\gamma}^{\alpha_1}$	-0.06	0.02	-0.05	0.01	0.09	0.06	-0.12	-0.18	-0.03	0.06	-0.06
p-value	0.187	0.821	0.206	0.918	0.336	0.134	0.157	0.095	0.682	0.098	0.195
$\bar{\psi}^{\alpha_1}$	0.59	0.51	0.68	0.67	0.52	0.68	0.59	0.64	0.63	0.63	0.58
p-value	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
$\bar{\gamma}^{\alpha_2}$	0.00	-0.04	0.02	-0.08	-0.09	-0.07	0.03	0.12	-0.02	-0.07	0.00
p-value	0.994	0.54	0.708	0.407	0.333	0.054	0.778	0.308	0.781	0.219	0.969
$\bar{\psi}^{\alpha_2}$	0.38	0.32	0.30	0.18	0.43	0.29	0.20	0.27	0.39	0.29	0.32
p-value	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
$\bar{\gamma}^{\alpha_3}$	0.04	-0.07	0.01	0.08	-0.16	0.06	-0.15	0.01	-0.02	-0.15	0.04
p-value	0.303	0.136	0.912	0.501	0.199	0.211	0.551	0.834	0.837	0.161	0.378
$\bar{\psi}^{\alpha_3}$	-0.16	-0.10	-0.12	-0.05	-0.04	-0.13	-0.04	-0.06	-0.20	-0.05	-0.11
p-value	0.000	0.000	0.000	0.052	0.193	0.000	0.241	0.014	0.000	0.121	0.000
$\bar{\gamma}^{\alpha_4}$	-0.04	0.06	0.00	0.00	0.06	0.03	0.00	0.07	0.04	0.04	0.01
p-value	0.409	0.042	0.966	0.94	0.668	0.385	0.963	0.222	0.021	0.398	0.755
$\bar{\psi}^{\alpha_4}$	0.03	0.03	0.03	0.07	-0.01	0.03	0.01	0.03	0.03	0.01	0.01
p-value	0.115	0.005	0.000	0.000	0.878	0.000	0.376	0.051	0.000	0.438	0.047

(b) $\hat{\alpha}_{kjt} = \psi^{\alpha_k} + \gamma^{\alpha_k} F2_t + u_{jt}^{\alpha_k}$

	Fama-French 12 Industry Classification										
	1	2	3	4	5	6	7	8	9	10	12
$\bar{\gamma}^{\alpha_0}$	0.71	0.89	0.49	0.79	-1.70	0.18	1.27	0.89	0.59	0.15	0.71
p-value	0.031	0.17	0.113	0.219	0.000	0.498	0.002	0.064	0.034	0.519	0.025
$\bar{\psi}^{\alpha_0}$	1.38	1.83	1.16	1.59	1.69	1.46	1.91	1.31	1.20	1.82	1.63
p-value	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
$\bar{\gamma}^{\alpha_1}$	0.06	0.07	0.07	-0.03	0.66	0.13	-0.10	0.11	0.09	0.00	0.07
p-value	0.428	0.623	0.36	0.841	0.000	0.166	0.317	0.548	0.331	0.98	0.266
$\bar{\psi}^{\alpha_1}$	0.59	0.51	0.67	0.67	0.50	0.68	0.59	0.63	0.63	0.63	0.58
p-value	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
$\bar{\gamma}^{\alpha_2}$	-0.12	-0.23	-0.03	-0.03	-0.39	-0.15	-0.16	-0.24	-0.09	0.06	-0.14
p-value	0.071	0.065	0.696	0.82	0.002	0.134	0.139	0.212	0.326	0.455	0.036
$\bar{\psi}^{\alpha_2}$	0.38	0.32	0.30	0.17	0.44	0.29	0.21	0.29	0.39	0.29	0.33
p-value	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
$\bar{\gamma}^{\alpha_3}$	0.00	0.22	0.02	0.09	-0.12	0.11	-0.11	-0.19	0.04	0.12	-0.15
p-value	0.991	0.013	0.828	0.409	0.335	0.135	0.096	0.007	0.679	0.769	0.012
$\bar{\psi}^{\alpha_3}$	-0.16	-0.11	-0.12	-0.05	-0.04	-0.13	-0.04	-0.05	-0.20	-0.06	-0.11
p-value	0.000	0.000	0.000	0.041	0.148	0.000	0.283	0.008	0.000	0.167	0.000
$\bar{\gamma}^{\alpha_4}$	0.04	0.11	0.01	0.08	0.50	-0.02	0.09	0.12	0.03	0.18	0.06
p-value	0.665	0.082	0.688	0.139	0.002	0.662	0.117	0.148	0.153	0.003	0.042
$\bar{\psi}^{\alpha_4}$	0.03	0.03	0.03	0.06	-0.02	0.03	0.01	0.03	0.03	0.01	0.01
p-value	0.137	0.003	0.000	0.000	0.604	0.000	0.502	0.077	0.000	0.553	0.069

(c) $\hat{\alpha}_{kjt} = \psi^{\alpha_k} + \gamma^{\alpha_k} F3_t + u_{jt}^{\alpha_k}$

	Fama-French 12 Industry Classification										
	1	2	3	4	5	6	7	8	9	10	12
$\bar{\gamma}^{\alpha_0}$	0.73	0.79	0.35	0.74	-2.49	0.08	1.56	0.83	0.51	0.11	0.59
p-value	0.146	0.468	0.459	0.498	0.000	0.853	0.021	0.284	0.311	0.709	0.272
$\bar{\psi}^{\alpha_0}$	1.39	1.84	1.17	1.59	1.70	1.46	1.91	1.31	1.20	1.83	1.63
p-value	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
$\bar{\gamma}^{\alpha_1}$	0.13	0.14	0.15	0.06	0.91	0.15	-0.16	0.20	0.17	-0.02	0.18
p-value	0.259	0.53	0.13	0.79	0.001	0.226	0.363	0.579	0.143	0.819	0.033
$\bar{\psi}^{\alpha_1}$	0.59	0.51	0.67	0.67	0.50	0.68	0.59	0.63	0.63	0.63	0.58
p-value	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
$\bar{\gamma}^{\alpha_2}$	-0.19	-0.29	-0.07	-0.12	-0.51	-0.15	-0.15	-0.32	-0.15	0.11	-0.24
p-value	0.105	0.129	0.49	0.581	0.033	0.207	0.44	0.417	0.233	0.271	0.009
$\bar{\psi}^{\alpha_2}$	0.38	0.32	0.30	0.18	0.44	0.29	0.21	0.29	0.39	0.29	0.33
p-value	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
$\bar{\gamma}^{\alpha_3}$	-0.04	0.29	0.07	0.18	-0.27	0.08	-0.10	-0.31	0.05	0.13	-0.18
p-value	0.67	0.127	0.521	0.219	0.151	0.464	0.38	0.001	0.723	0.766	0.051
$\bar{\psi}^{\alpha_3}$	-0.16	-0.11	-0.12	-0.05	-0.04	-0.13	-0.04	-0.05	-0.20	-0.06	-0.11
p-value	0.000	0.000	0.000	0.039	0.172	0.000	0.281	0.011	0.000	0.154	0.000
$\bar{\gamma}^{\alpha_4}$	0.05	0.11	0.02	0.09	0.66	0.02	0.06	0.18	0.03	0.27	0.09
p-value	0.744	0.208	0.685	0.301	0.018	0.824	0.502	0.153	0.372	0.005	0.083
$\bar{\psi}^{\alpha_4}$	0.03	0.03	0.03	0.06	-0.02	0.03	0.01	0.03	0.03	0.01	0.01
p-value	0.132	0.004	0.000	0.000	0.641	0.000	0.465	0.089	0.000	0.587	0.079)

Table 8

Average size, average volatility and ex-ante βs for portfolios formed on market-to-book components and size

The table shows average size (ASI), average volatility ($\bar{\sigma}$) and average market exposure ($\bar{\beta}$) for 10 equal-weighted portfolios formed on the basis of $m_{it}-b_{it}$, $m_{it}-v(\theta_{it};\alpha_{jt})$, $v(\theta_{it};\alpha_{jt})-v(\theta_{it};\alpha_{j})$ and $v(\theta_{it};\alpha_{j})-b_{it}$ for a sample of 119,403 observations over the period 1981-2016. Long/short dollar neutral positions are taken on July 1st of each year in the bottom/top decile of firms sorted as of June 30th. The Average Size Index (ASI) represents the average size of firms forming each portfolio according to the ranking on market capitalization defined by NYSE breakpoints. The ASI is calculated at the rebalancing dates. Column ASI reports the time-series average of this indicator on portfolios formed from 1981 to 2016. At the end of June of each year, for each portfolio, we average the annual standard deviations of the constituents obtaining portfolio-level average volatility. Column $\bar{\sigma}$ contains the time-series average of this portfolio-level estimate. For each firm, we estimate β on CRSP value-weighted index over a five-years rolling window. At the end of June, we calculate the ex-ante β of each portfolio by averaging βs of the constituents. Column $\bar{\beta}$ reports the time-series average of portfolio-level average β. Panel(a) summarizes characteristics of portfolios formed on market-to-book components. Panel(b) summarizes characteristics of portfolios formed on market-to-book components adjusting for size.

(a) Portfolio formed on market-to-book components

	$m_{it}-b_{it}$			$m_{it}-v(\theta_{it};\alpha_{jt})$			$v(\theta_{it};\alpha_{jt})-v(\theta_{it};\alpha_{j})$			$v(\theta_{it};\alpha_{j})-b_{it}$		
	1	*2*	*3*	*4*	*5*	*6*	*7*	*8*	*9*	*10*	*11*	*12*
Ranking	ASI	$\bar{\sigma}$	$\bar{\beta}$	ASI	$\bar{\sigma}$	$\bar{\beta}$	ASI	$\bar{\sigma}$	$\bar{\beta}$	ASI	$\bar{\sigma}$	$\bar{\beta}$
Low	2.2	14.73%	1.12	1.7	16.50%	1.19	3.9	14.19%	1.25	4.8	11.78%	1.10
2	2.5	13.89%	1.15	1.9	15.39%	1.21	3.6	13.51%	1.22	4.3	11.64%	1.05
3	3.1	12.76%	1.12	2.5	13.80%	1.20	3.5	13.84%	1.22	3.9	11.82%	1.07
4	3.5	12.13%	1.10	3.0	13.06%	1.16	3.6	13.15%	1.16	3.8	12.11%	1.10
5	3.8	12.23%	1.13	3.6	12.53%	1.15	3.6	12.82%	1.13	3.7	12.42%	1.13
6	4.0	12.55%	1.17	4.1	12.05%	1.13	3.6	12.75%	1.12	3.8	12.79%	1.18
7	4.4	12.80%	1.20	4.5	12.12%	1.14	3.6	13.00%	1.12	3.6	13.39%	1.21
8	4.6	13.41%	1.24	4.9	12.47%	1.17	3.6	13.76%	1.20	3.5	14.26%	1.29
9	4.6	14.42%	1.29	5.2	13.13%	1.21	3.8	14.29%	1.23	3.2	15.82%	1.34
High	4.3	16.76%	1.38	5.4	14.72%	1.31	4.2	14.38%	1.23	2.3	20.04%	1.41

(b) Portfolio formed on market-to-book components adjusting for size

	$m_{it}-b_{it}$			$m_{it}-v(\theta_{it};\alpha_{jt})$			$v(\theta_{it};\alpha_{jt})-v(\theta_{it};\alpha_{j})$			$v(\theta_{it};\alpha_{j})-b_{it}$		
	1	*2*	*3*	*4*	*5*	*6*	*7*	*8*	*9*	*10*	*11*	*12*
Ranking	ASI	$\bar{\sigma}$	$\bar{\beta}$	ASI	$\bar{\sigma}$	$\bar{\beta}$	ASI	$\bar{\sigma}$	$\bar{\beta}$	ASI	$\bar{\sigma}$	$\bar{\beta}$
Low	3.7	12.85%	1.13	3.7	13.58%	1.20	3.7	13.99%	1.28	3.7	12.59%	1.12
2	3.7	13.57%	1.20	3.7	13.57%	1.20	3.7	13.33%	1.23	3.7	12.22%	1.05
3	3.7	12.93%	1.15	3.7	12.93%	1.15	3.7	13.14%	1.21	3.7	11.94%	1.03
4	3.7	12.56%	1.13	3.7	12.56%	1.13	3.7	13.12%	1.16	3.7	12.22%	1.09
5	3.7	12.44%	1.13	3.7	12.44%	1.13	3.7	12.97%	1.13	3.7	12.61%	1.14
6	3.7	12.57%	1.14	3.7	12.57%	1.14	3.7	12.95%	1.12	3.7	13.13%	1.18
7	3.7	13.05%	1.16	3.7	13.05%	1.16	3.7	13.06%	1.10	3.7	13.66%	1.23
8	3.7	13.60%	1.19	3.7	13.60%	1.19	3.7	13.86%	1.19	3.7	14.39%	1.29
9	3.7	14.67%	1.25	3.7	14.67%	1.25	3.7	14.37%	1.21	3.7	15.51%	1.34
High	3.7	16.68%	1.35	3.7	16.68%	1.35	3.7	14.87%	1.23	3.7	17.65%	1.41

Table 9

Average size, average volatility and ex-ante βs for portfolios formed on market-to-book components orthogonalized to the U.S. 10-Year Treasury Yield

The table shows average size (ASI), average volatility ($\bar{\sigma}$) and average market exposure ($\bar{\beta}$) for 10 equal-weighted portfolios formed on the basis of $m_{it} - b_{it}$, $m_{it} - v(\theta_{it}; \alpha_{jt})$, $v(\theta_{it}; \alpha_{jt}) - v(\theta_{it}; \alpha_j)$ and $v(\theta_{it}; \alpha_j) - b_{it}$ for a sample of 119,403 observations over the period 1981-2016. Long/short dollar neutral positions are taken on July 1st of each year in the bottom/top decile of firms sorted as of June 30*th*. The Average Size Index (ASI) represents the average size of firms forming each portfolio according to the ranking on market capitalization defined by NYSE breakpoints. The ASI is calculated at the rebalancing dates. Column ASI reports the time-series average of this indicator on portfolios formed from 1981 to 2016. At the end of June of each year, for each portfolio, we average the annual standard deviations of the constituents obtaining portfolio-level average volatility. Column $\bar{\sigma}$ contains the time-series average of this portfolio-level estimate. For each firm, we estimate β on CRSP value-weighted index over a five-years rolling window. At the end of June, we calculate the ex-ante β of each portfolio by averaging βs of the constituents. Column $\bar{\beta}$ reports the time-series average of portfolio-level average β. Panel(a) summarizes characteristics of portfolios formed on market-to-book components. Panel(b) summarizes characteristics of portfolios formed on market-to-book components adjusting for size.

(a) Portfolio formed on market-to-book components

	$m_{it} - v(\theta_{it}; \alpha_{jt})$			$v(\theta_{it}; \alpha_{jt}) - v(\theta_{it}; \alpha_j)$			$v(\theta_{it}; \alpha_j) - b_{it}$		
	1	*2*	*3*	*4*	*5*	*6*	*7*	*8*	*9*
Ranking	ASI	$\bar{\sigma}$	$\bar{\beta}$	ASI	$\bar{\sigma}$	$\bar{\beta}$	ASI	$\bar{\sigma}$	$\bar{\beta}$
Low	1.0	19.69%	1.06	4.0	14.24%	1.25	8.4	8.41%	0.98
2	1.0	16.78%	1.20	3.6	13.47%	1.23	6.9	9.81%	1.09
3	1.1	15.54%	1.24	3.5	13.54%	1.20	5.5	10.69%	1.14
4	1.6	14.83%	1.28	3.5	13.28%	1.15	4.2	11.78%	1.18
5	2.3	14.02%	1.31	3.6	12.79%	1.15	3.3	12.78%	1.24
6	3.2	13.19%	1.26	3.6	12.73%	1.12	2.5	13.95%	1.26
7	4.3	12.29%	1.23	3.6	13.08%	1.13	2.0	14.80%	1.27
8	5.7	11.32%	1.17	3.6	13.87%	1.19	1.6	15.63%	1.27
9	7.5	10.05%	1.12	3.7	14.36%	1.22	1.3	17.56%	1.25
High	9.4	8.40%	1.00	4.3	14.32%	1.23	1.1	20.80%	1.19

(b) Portfolio formed on market-to-book components

	$m_{it} - v(\theta_{it}; \alpha_{jt})$			$v(\theta_{it}; \alpha_{jt}) - v(\theta_{it}; \alpha_j)$			$v(\theta_{it}; \alpha_j) - b_{it}$		
	1	*2*	*3*	*4*	*5*	*6*	*7*	*8*	*9*
Ranking	ASI	$\bar{\sigma}$	$\bar{\beta}$	ASI	$\bar{\sigma}$	$\bar{\beta}$	ASI	$\bar{\sigma}$	$\bar{\beta}$
Low	3.7	15.94%	1.22	3.7	14.10%	1.29	3.7	11.78%	1.12
2	3.7	13.29%	1.22	3.7	13.29%	1.22	3.7	11.87%	1.10
3	3.7	13.01%	1.20	3.7	13.01%	1.20	3.7	11.75%	1.10
4	3.7	13.07%	1.15	3.7	13.07%	1.15	3.7	12.10%	1.13
5	3.7	13.00%	1.13	3.7	13.00%	1.13	3.7	12.57%	1.16
6	3.7	12.88%	1.12	3.7	12.88%	1.12	3.7	13.17%	1.20
7	3.7	13.12%	1.13	3.7	13.12%	1.13	3.7	13.91%	1.22
8	3.7	13.93%	1.17	3.7	13.93%	1.17	3.7	14.79%	1.25
9	3.7	14.36%	1.22	3.7	14.36%	1.22	3.7	15.85%	1.28
High	3.7	14.90%	1.24	3.7	14.90%	1.24	3.7	18.20%	1.33

Table 10

Average size, average volatility and ex-ante βs for portfolios formed on market-to-book components orthogonalized to the Term Structure

The table shows average size (ASI), average volatility ($\bar{\sigma}$) and average market exposure ($\bar{\beta}$) for 10 equal-weighted portfolios formed on the basis of $m_{it} - b_{it}$, $m_{it} - v(\theta_{it}; \alpha_{jt})$, $v(\theta_{it}; \alpha_{jt}) - v(\theta_{it}; \alpha_j)$ and $v(\theta_{it}; \alpha_j) - b_{it}$ for a sample of 119,403 observations over the period 1981-2016. Long/short dollar neutral positions are taken on July 1st of each year in the bottom/top decile of firms sorted as of June 30th. The Average Size Index (ASI) represents the average size of firms forming each portfolio according to the ranking on market capitalization defined by NYSE breakpoints. The ASI is calculated at the rebalancing dates. Column ASI reports the time-series average of this indicator on portfolios formed from 1981 to 2016. At the end of June of each year, for each portfolio, we average the annual standard deviations of the constituents obtaining portfolio-level average volatility. Column $\bar{\sigma}$ contains the time-series average of this portfolio-level estimate. For each firm, we estimate β on CRSP value-weighted index over a five-years rolling window. At the end of June, we calculate the ex-ante β of each portfolio by averaging βs of the constituents. Column $\bar{\beta}$ reports the time-series average of portfolio-level average β. Panel(a) summarizes characteristics of portfolios formed on market-to-book components. Panel(b) summarizes characteristics of portfolios formed on market-to-book components adjusting for size.

(a) Portfolio formed on market-to-book components

	$m_{it} - v(\theta_{it}; \alpha_{jt})$			$v(\theta_{it}; \alpha_{jt}) - v(\theta_{it}; \alpha_j)$			$v(\theta_{it}; \alpha_j) - b_{it}$		
	1	*2*	*3*	*4*	*5*	*6*	*7*	*8*	*9*
Ranking	ASI	$\bar{\sigma}$	$\bar{\beta}$	ASI	$\bar{\sigma}$	$\bar{\beta}$	ASI	$\bar{\sigma}$	$\bar{\beta}$
Low	1.0	19.79%	1.08	3.9	14.01%	1.22	8.4	8.41%	0.98
2	1.0	16.77%	1.19	3.5	13.56%	1.22	6.9	9.80%	1.10
3	1.1	15.64%	1.25	3.5	13.61%	1.21	5.5	10.67%	1.13
4	1.6	14.74%	1.28	3.6	13.10%	1.15	4.2	11.73%	1.17
5	2.3	14.01%	1.30	3.6	12.92%	1.13	3.3	12.79%	1.25
6	3.2	13.17%	1.25	3.6	12.78%	1.14	2.5	13.94%	1.26
7	4.3	12.30%	1.23	3.6	13.15%	1.16	2.0	14.78%	1.26
8	5.7	11.29%	1.17	3.6	13.81%	1.19	1.6	15.60%	1.27
9	7.4	10.02%	1.12	3.7	14.31%	1.22	1.3	17.66%	1.26
High	9.4	8.40%	1.00	4.2	14.44%	1.24	1.1	20.80%	1.19

(b) Portfolio formed on market-to-book components adjusting for size

	$m_{it} - v(\theta_{it}; \alpha_{jt})$			$v(\theta_{it}; \alpha_{jt}) - v(\theta_{it}; \alpha_j)$			$v(\theta_{it}; \alpha_j) - b_{it}$		
	1	*2*	*3*	*4*	*5*	*6*	*7*	*8*	*9*
Ranking	ASI	$\bar{\sigma}$	$\bar{\beta}$	ASI	$\bar{\sigma}$	$\bar{\beta}$	ASI	$\bar{\sigma}$	$\bar{\beta}$
Low	3.7	16.00%	1.23	3.7	13.99%	1.26	3.7	11.76%	1.12
2	3.7	13.29%	1.23	3.7	13.29%	1.23	3.7	11.81%	1.09
3	3.7	12.97%	1.19	3.7	12.97%	1.19	3.7	11.75%	1.10
4	3.7	13.00%	1.15	3.7	13.00%	1.15	3.7	12.11%	1.13
5	3.7	13.08%	1.13	3.7	13.08%	1.13	3.7	12.58%	1.16
6	3.7	12.97%	1.13	3.7	12.97%	1.13	3.7	13.18%	1.20
7	3.7	13.34%	1.15	3.7	13.34%	1.15	3.7	13.94%	1.22
8	3.7	13.79%	1.19	3.7	13.79%	1.19	3.7	14.80%	1.25
9	3.7	14.28%	1.22	3.7	14.28%	1.22	3.7	15.82%	1.28
High	3.7	14.96%	1.23	3.7	14.96%	1.23	3.7	18.26%	1.33

Table 11

Average monthly returns on portfolios sorted on market-to-book components orthogonalized to the U.S. 10-Year Treasury Yield

The table shows average monthly returns for 10 equal-weighted (ew) portfolios formed on the basis of $m_{it} - b_{it}$, $m_{it} - v(\theta_{it}; \alpha_{jt})$, $v(\theta_{it}; \alpha_{jt}) - v(\theta_{it}; \alpha_j)$ and $v(\theta_{it}; \alpha_j) - b_{it}$ for a sample of 119,403 observations over the period 1981-2016. Long/short dollar neutral positions are taken on July 1st of each year in the bottom/top decile of firms sorted as of June 30*th*. Value weighted (vw) hedge portfolio returns and annualized Sharpe ratios (for equally weighted strategy) are also reported. The p-value rows report the significance resulting from t tests on the equality of means performed on High and Low average returns by Welch's formula. Panel (b) summarizes average monthly return of portfolios formed on market-to-book components adjusting for size.

(a) Portfolio formed on market-to-book components

Ranking	$m_{it} - v(\theta_{it}; \alpha_{jt})$	$v(\theta_{it}; \alpha_{jt}) - v(\theta_{it}; \alpha_j)$	$v(\theta_{it}; \alpha_j) - b_{it}$
Low	4.10%	1.58%	0.35%
2	2.52%	1.23%	0.40%
3	1.33%	1.06%	0.51%
4	1.04%	1.38%	0.68%
5	0.64%	1.10%	0.69%
6	0.55%	1.16%	0.86%
7	0.38%	1.22%	1.20%
8	0.32%	0.92%	1.38%
9	0.32%	0.76%	2.00%
High	0.12%	1.11%	3.42%
Low-High (ew)	3.98%	0.47%	-3.07%
p-value	0.000	0.512	0.000
Low-High (vw)	2.81%	0.42%	-1.19%
p-value	0.000	0.372	0.007
Annualized Sharpe Ratio	1.55	0.06	-1.29

(b) Portfolio formed on market-to-book components adjusting for size

Ranking	$m_{it} - v(\theta_{it}; \alpha_{jt})$	$v(\theta_{it}; \alpha_{jt}) - v(\theta_{it}; \alpha_j)$	$v(\theta_{it}; \alpha_j) - b_{it}$
Low	2.25%	1.50%	1.09%
2	1.46%	1.13%	1.27%
3	1.39%	1.09%	1.13%
4	1.20%	1.18%	1.04%
5	1.17%	1.22%	0.92%
6	0.93%	1.47%	1.07%
7	0.88%	0.93%	1.06%
8	0.80%	0.91%	1.22%
9	0.78%	0.90%	1.39%
High	0.79%	1.27%	1.43%
Low-High (ew)	1.45%	0.23%	-0.34%
p-value	0.003	0.723	0.473
Low-High (vw)	-0.14%	0.18%	0.37%
p-value	0.733	0.693	0.303
Annualized Sharpe Ratio	0.85	0.00	-0.26

Table 12

Average monthly returns on portfolios sorted on market-to-book components orthogonalized to the Term Structure

The table shows average monthly returns for 10 equal-weighted (ew) portfolios formed on the basis of $m_{it} - b_{it}$, $m_{it} - v(\theta_{it}; \alpha_{jt})$, $v(\theta_{it}; \alpha_{jt}) - v(\theta_{it}; \alpha_j)$ and $v(\theta_{it}; \alpha_j) - b_{it}$ for a sample of 119,403 observations over the period 1981-2016. Long/short dollar neutral positions are taken on July 1st of each year in the bottom/top decile of firms sorted as of June 30th. Value weighted (vw) hedge portfolio returns and annualized Sharpe ratios (for equally weighted strategy) are also reported. The p-value rows report the significance resulting from t tests on the equality of means performed on High and Low average returns by Welch's formula. Panel (b) summarizes average monthly return of portfolios formed on market-to-book components adjusting for size.

(a) Portfolio formed on market-to-book components

Ranking	$m_{it} - v(\theta_{it}; \alpha_{jt})$	$v(\theta_{it}; \alpha_{jt}) - v(\theta_{it}; \alpha_j)$	$v(\theta_{it}; \alpha_j) - b_{it}$
Low	4.17%	1.56%	0.35%
2	2.44%	1.26%	0.40%
3	1.36%	1.35%	0.50%
4	1.00%	1.31%	0.65%
5	0.67%	0.92%	0.71%
6	0.55%	1.31%	0.99%
7	0.38%	0.91%	1.15%
8	0.30%	0.95%	1.31%
9	0.31%	0.85%	2.02%
High	0.13%	1.11%	3.39%
Low-High (ew)	4.05%	0.45%	-3.05%
p-value	0.000	0.491	0.000
Low-High (vw)	2.94%	0.31%	-1.15%
p-value	0.000	0.480	0.009
Annualized Sharpe Ratio	1.56	0.07	-1.28

(b) Portfolio formed on market-to-book components adjusting for size

Ranking	$m_{it} - v(\theta_{it}; \alpha_{jt})$	$v(\theta_{it}; \alpha_{jt}) - v(\theta_{it}; \alpha_j)$	$v(\theta_{it}; \alpha_j) - b_{it}$
Low	2.25%	1.41%	1.24%
2	1.48%	1.25%	1.09%
3	1.33%	1.14%	1.15%
4	1.33%	1.26%	0.92%
5	1.09%	1.35%	1.04%
6	0.99%	1.11%	1.04%
7	0.89%	0.94%	1.12%
8	0.78%	0.88%	1.19%
9	0.79%	0.94%	1.40%
High	0.73%	1.34%	1.43%
Low-High (ew)	1.52%	0.07%	-0.19%
p-value	0.002	0.957	0.759
Low-High (vw)	-0.01%	0.11%	0.43%
p-value	0.986	0.783	0.238
Annualized Sharpe Ratio	0.83	-0.08	-0.13

Appendix

A.1 Short-Term Treasury Yields and Expectations

The three main influences on the Treasury Term Structure are the market's rate expectations of future rate changes, the expected return differential due to the difference in maturities (bond risk premium) and the differences in convexity across maturities (convexity bias).

Of course, all three forces influence bond yields simultaneously making the task of interpreting the overall yield curve shape quite difficult. Even though an exact decomposition is not possible the relative weight of each component will be different depending on the maturity; for example, for short-term rates, the convexity bias is so small that it can be ignored (Ilmanen, 1995). Accordingly, expectations regarding future changes in rates will have significant effect on the yields corresponding to the maturities in which the event is expected to occur. In this regard, monetary policy interventions represent one of the most critical determinants of the expectations on interest rates.

Figure 1

Market's rate expectations and Monetary Policy Interventions

The figure plots the evolution of the Treasury yield spread (bold dark grey, lhs) between the 2-year and 3-month interest rates (constant maturity), and the Fed fund rate (dot blue, rhs), in percentage points. NBER-defined recession dates shaded gray. Source: Federal Reserve Board via FRED, Bloomberg, NBER, author's calculations.

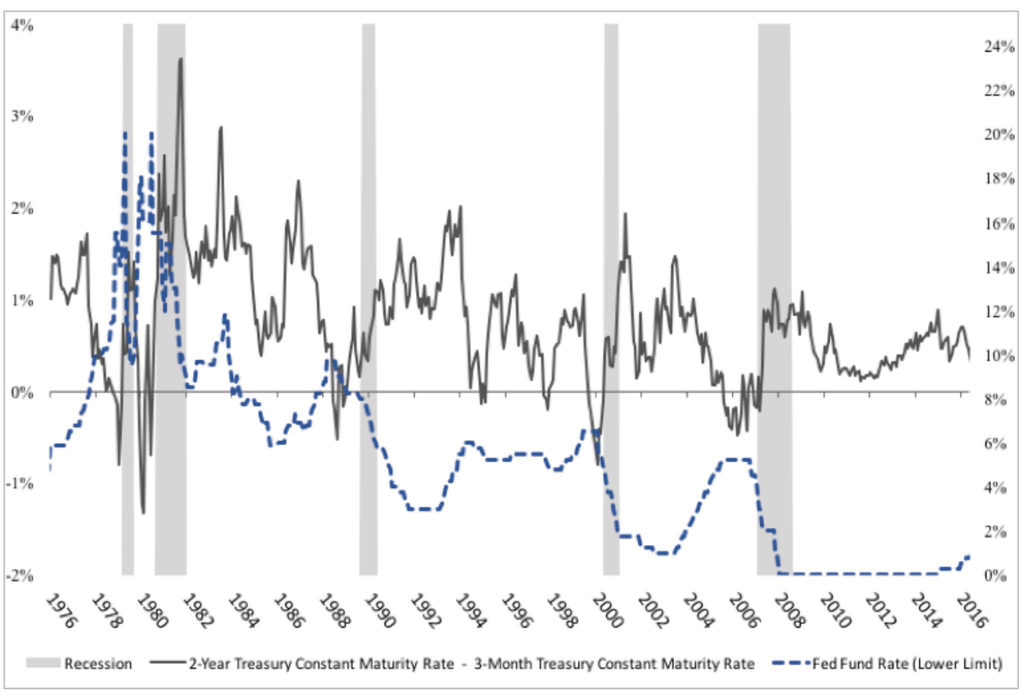
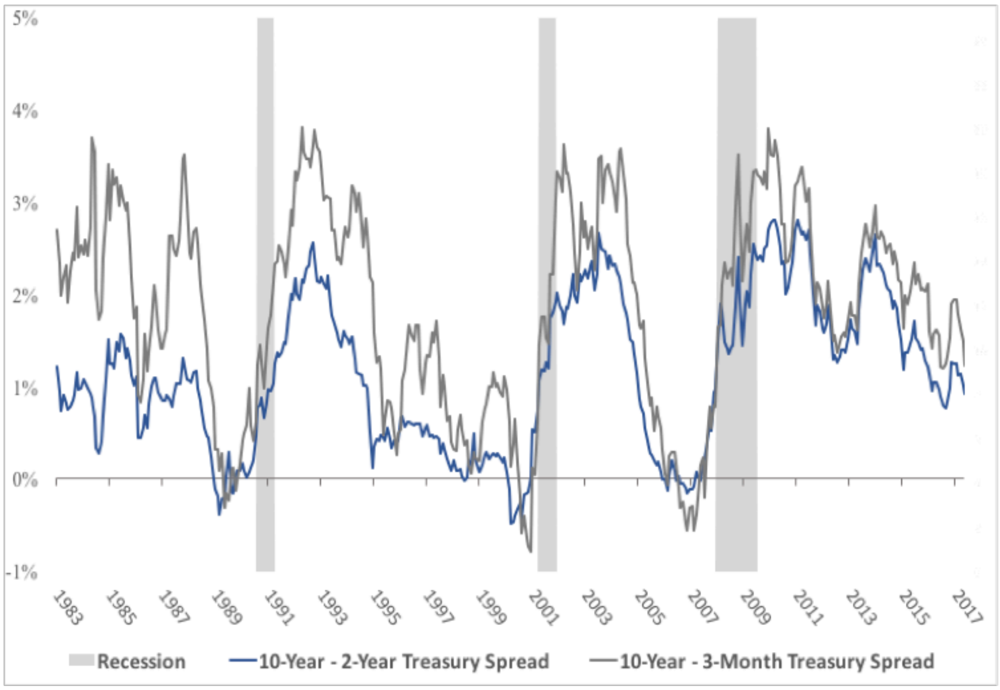


Figure 2

Treasury Spread Reactivity

The figure plots the evolution of the Treasury yield spread (grey) between the 10-year and 3-month interest rates (constant maturity) and the Treasury yield spread (blue) between the 10-year and 2-Year interest rates (constant maturity), in percentage points. NBER-defined recession dates shaded gray. Source: Federal Reserve Board via FRED, Bloomberg, NBER, author's calculations.



The differential return between 2-year and 3-month government bonds is mostly attributable to the market expectations and the risk premium. However, the relative weight of the expectations component results higher in the 2-year yield than in 3-month yield, especially when the market is pricing a Fed's intervention. This effect has an intuitive explanation; the 2-year maturity fits the average time window which the Central Bank historically spent to implement the stream of interest rates actions for each intervention. Figure 1 provides some evidence; approaching to an easing cycle before a recession, the expectations of yield declines and capital gains hit stronger the 2-year yield than the 3-month rate, until to generate a negative differential return. More in general, Figure 1 shows that in the periods preceding an action on Fed fund rates, either easing or tightening, the spread between 2-year and 3-month yields experiences extreme variations due to the particular 2-year yield sensitivity to expectations concerning future rates changes. Moreover, Figure 2 shows that the spread between the 10-year and 2-year note tends to anticipate the spread between 10-year and 3-month yield, especially in downward swings right before a recession.

These evidences about the efficacy of 2-year yield to capture the expectations effect supports choice in calculating the slope of the Yield Curve as the difference between 10-year and 2-year yields, instead of the commonly used formulation 10-year minus 3-month interest rate.

Table 13

Industry composition

F-F code	Industry	Firm-years	% of obs.
1	Consumer Non-Durables	7,954	7%
2	Consumer Durables	3,942	3%
3	Manufacturing	16,401	14%
4	Oil & Gas	6,456	5%
5	Chemicals and Allied Products	3,833	3%
6	Business Equipment	25,637	21%
7	Telephone and TV Trasmission	4,533	4%
8	Utilities	5,989	5%
9	Wholesale	12,739	11%
10	Healthcare & Medical	14,541	12%
12	Everything else (except finance)	17,378	15%
Total		**119,403**	**100%**

Table 14

Descriptive statistics for the variables used in the valuation model

Panel (a) reports the distribution of the main variables and Panel (b) reports Pearson (above diagonal) and Spearman (below diagonal) correlation statistics. Descriptives are based on a sample of 119,403 firm-year observations. The variables are defined as follows: m is the log of market value of equity, b is the log of book value of common equity, ni^+ is the log of net income, LEV is book leverage. An indicator variable $I(<0)$ is interacted with the log of absolute net income (ni^+) taking the value of 1 if net income is negative and zero otherwise.

(a) Distributional statistics

	Mean	St.dev	1%	5%	25%	Median	75%	95%	99%
m	5.612	2.095	1.099	2.312	4.117	5.552	7.017	9.180	10.681
b	4.957	2.050	0.325	1.722	3.577	4.878	6.309	8.479	9.922
ni^+	2.965	2.155	-2.064	-0.470	1.537	2.908	4.354	6.634	8.199
$I_(< 0)$	0.647	1.492	-0.947	0.000	0.000	0.000	0.000	4.093	6.110
LEV	0.488	0.220	0.055	0.125	0.318	0.498	0.653	0.849	0.961

(b) Pearson (Spearman) Correlations above (below) the diagonal

	m	b	ni^+	LEV
m	1	0.833	0.802	0.103
b	0.824	1	0.842	0.183
ni^+	0.802	0.859	1	0.180
LEV	0.09	0.128	0.167	1

Table 15

Definition of Variables

Accounting Variables

Symbol	Name	Definition	Frequency	Treatment	Source
m	Market Value of Equity	Market value of equity obtained on June 30 as the product of shares outstanding (CRSP item SHROUT) and price (CRSP item PRC)	Annual	Logarithm	CRSP
b	Book Value	Book value of common equity obtained at fiscal year-end (Compustat item CEQ).	Annual	Logarithm	Compustat
ni	Net Income	Net income obtained at fiscal year-end (Compustat item NI).	Annual	Logarithm	Compustat
LEV	Book Leverage	Book leverage is the ratio of long-term debt and debt in current liabilities (Compustat items DLTT and DLC) to common equity (Compustat item CEQ).	Annual	Logarithm	Compustat

Macroeconomic Variables

Symbol	Name	Definition	Frequency	Treatment	Source
US10YR	U.S. 10-Year Treasury Yield	Yield	Annual	12 month average. The estimation period for the average starts in June of the previous year.	Federal Reserve Bank of St. Louis
TERM	Term Structure Slope	Difference between 10-Year Treasury Yield and 2-Year Note Yield	Annual	12 month average. The estimation period for the average starts in June of the previous year.	Federal Reserve Bank of St. Louis
PMI	ISM Purchasing Managers Index	Index level	Annual	12 month average. The estimation period for the average starts in June of the previous year.	Institute for Supply Management
LEI	The Conference Board Leading Economic Index (United States)	Index Level	Annual	First difference of the 12 month average. The estimation period for the average starts in June of the previous year.	The Conference Board, Inc.
CPIYOY	1-Year CPI Inflation Rate	Percent Change from Year Ago	Annual	12 month average. The estimation period for the average starts in June of the previous year.	U.S. Bureau of Labor Statistics

Table 16

Descriptive statistics for the macroeconomic variables

Panel (a) reports the distribution of the macroeconomic variables and Panel (b) reports Pearson (above diagonal) and Spearman (below diagonal) correlation statistics estimated over the period from 1976 to 2016. Descriptives are based on a sample of 492 monthly observations. The variables are defined as follows: $US10YR$ is the U.S. 10-Year Treasury Yield, $TERM$ is the slope of Term Structure, PMI is the ISM Manufacturing Purchasing Managers Index and LEI is the first difference in levels of Conference Board Economic Leading Indicator.

(a) Distributional statistics

	Mean	St.dev	1%	5%	25%	Median	75%	95%	99%
US10YR	6.48	3.20	1.56	1.92	4.02	6.17	8.40	12.72	14.44
TERM	0.97	0.93	-1.33	- 0.57	0.26	0.97	1.67	2.44	2.75
PMI	52.00	5.81	35.00	39.40	49.30	52.60	55.85	60.10	63.10
LEI	0.11	0.54	- 2.00	- 0.90	- 0.10	0.20	0.50	0.80	1.00

(b) Pearson (Spearman) Correlations above (below) the diagonal

	$US10YR$	$TERM$	PMI	$DLEI$
$US10YR$	1	-0.54	-0.11	-0.04
$TERM$	-0.53	1	0.11	0.24
PMI	-0.02	0.12	1	0.49
LEI	-0.09	0.33	0.45	1

Table 17

Correlation of long-run multiples for different rolling windows

The table shows Pearson (Columns 1 and 3) and Spearman (Column 2) correlation statistics. The long-run multiples are calculated by averaging on a 5-year and 10-year rolling windows getting two different long-run estimates for each fundamental multiple. Column 1 reports the Pearson correlation between the 5-year and 10-year estimates. Column 2 reports the Spearman correlation between the 5-year and 10-year estimates. While to calculate correlation in Column 1 and 2 we collapse long-run multiples according to date (over the sectors), in Column 3 we report the average of correlations estimated for each sector. For each row, ρ_j is the correlation for estimates of multiple $\hat{\alpha_j}$ and $p-value$ is the significance level with $H_0 = 0$

	Pearson	**Spearman**	**Sector Average**
ρ_0	0.98	0.99	0.78
p-value	0.000	0.000	0.001
ρ_1	0.96	1.00	0.70
p-value	0.000	0.000	0.002
ρ_2	0.99	0.99	0.71
p-value	0.000	0.000	0.000
ρ_3	0.91	0.95	0.76
p-value	0.001	0.000	0.002
ρ_4	1.00	0.99	0.77
p-value	0.000	0.000	0.000

Table 18

Average monthly returns on portfolios sorted on the value-to-book component, size and β.

The table shows average monthly returns for 10 equal-weighted (ew) portfolios formed on the basis of $v(\theta_{it};\alpha_{jt}) - b_{it}$ for a sample of 119,403 observations over the period 1981-2016.Long/short dollar neutral positions are taken on July 1st of each year in the bottom/top decile of firms sorted as of June 30*th*. Value weighted (vw) hedge portfolio returns and annualized Sharpe ratios (for equally weighted strategy) are also reported. The p-value rows report the significance resulting from t tests on the equality of means performed on High and Low average returns by Welch's formula. Column (1) reports the average return of portfolios formed on the value-to-book component. Column (2) reports the average return of portfolios formed on the value-to-book component adjusting for size. Column (3) reports the average return of portfolios formed on the value-to-book component adjusting for size and β.

	raw	*adjusting for size*	*adjusting for size and* β
Ranking	$v(\theta_{it};\alpha_{jt}) - b_{it}$	$v(\theta_{it};\alpha_{jt}) - b_{it}$ and size	$v(\theta_{it};\alpha_{jt}) - b_{it}$ and β
Low	0.88%	1.05%	1.07%
2	0.88%	1.00%	0.92%
3	0.91%	1.00%	1.04%
4	0.91%	0.93%	0.88%
5	0.91%	1.12%	1.09%
6	0.86%	1.09%	1.10%
7	1.10%	1.04%	1.25%
8	1.20%	1.15%	1.42%
9	1.27%	1.47%	1.51%
High	2.60%	1.76%	1.74%
Low-High (ew)	-1.72%	-0.71%	-0.67%
p-value	0.003	0.188	0.171
Low-High (vw)	-0.10%	0.34%	0.22%
p-value	1.000	0.442	0.628
Annualized Sharpe Ratio	-0.68	-0.38	-0.38

Table 19

BICS industry composition

BICS code	**Industry**	**Firm-years**	**% of obs.**
1	Basic Materials	5,890	5%
2	Communications	10,230	9%
3	Consumer, Cyclical	15,739	14%
4	Consumer, Non-cyclical	25,378	23%
5	Energy	7,883	7%
7	Healthcare	4,794	4%
8	Industrial	20,770	19%
9	Technology	13,320	12%
10	Utilities	5,006	5%
Total		**109,010**	**100%**

Table 20

Average monthly returns on portfolios sorted on market-to-book components and size (BICS classifications)

The table shows average monthly returns for 10 equal-weighted (ew) portfolios formed on the basis of $m_{it} - b_{it}$, $m_{it} - v(\theta_{it}; \alpha_{jt})$, $v(\theta_{it}; \alpha_{jt}) - v(\theta_{it}; \alpha_j)$ and $v(\theta_{it}; \alpha_j) - b_{it}$ for a sample of 119,403 observations over the period 1981-2016. Long/short dollar neutral positions are taken on July 1st of each year in the bottom/top decile of firms sorted as of June 30th. Value weighted (vw) hedge portfolio returns and annualized Sharpe ratios (for equally weighted strategy) are also reported. The p-value rows report the significance resulting from t tests on the equality of means performed on High and Low average returns by Welch's formula. Panel (b) summarizes average monthly return of portfolios formed on marke-to-book components controlling for size.

(a) Stocks sorted on market-to-book components

Ranking	$m_{it} - b_{it}$	$m_{it} - v(\theta_{it}; \alpha_{jt})$	$v(\theta_{it}; \alpha_{jt}) - v(\theta_{it}; \alpha_j)$	$v(\theta_{it}; \alpha_j) - b_{it}$
Low	2.95%	3.57%	1.65%	0.93%
2	1.85%	1.84%	1.26%	0.85%
3	1.36%	1.56%	1.57%	0.84%
4	1.07%	1.30%	1.08%	0.88%
5	0.98%	0.93%	1.01%	0.67%
6	0.93%	0.91%	1.07%	0.84%
7	0.87%	0.62%	1.19%	1.04%
8	0.78%	0.58%	1.00%	1.23%
9	0.33%	0.20%	0.87%	1.65%
High	0.52%	0.12%	1.09%	2.87%
Low-High (ew)	2.43%	3.45%	0.55%	-1.94%
p-value	0.000	0.000	0.321	0.001
Low-High (cw)	0.96%	0.86%	0.48%	-0.19%
p-value	0.015	0.015	0.297	0.670
Annualized Sharpe Ratio	1.01	1.41	0.15	-0.73

(b) Stocks sorted on market-to-book components adjusting for size

Ranking	$m_{it} - b_{it}$	$m_{it} - v(\theta_{it}; \alpha_{jt})$	$v(\theta_{it}; \alpha_{jt}) - v(\theta_{it}; \alpha_j)$	$v(\theta_{it}; \alpha_j) - b_{it}$
Low	2.26%	2.55%	1.66%	1.11%
2	1.60%	1.66%	1.22%	1.01%
3	1.27%	1.36%	1.12%	0.83%
4	1.13%	1.10%	1.15%	1.00%
5	1.14%	1.09%	1.10%	1.01%
6	0.95%	1.10%	1.15%	1.05%
7	0.91%	0.93%	0.94%	0.94%
8	1.04%	0.81%	1.24%	1.50%
9	0.70%	0.68%	1.07%	1.60%
High	0.74%	0.47%	1.22%	1.87%
Low-High (ew)	1.51%	2.08%	0.44%	-0.77%
p-value	0.003	0.000	0.417	0.107
Low-High (cw)	0.63%	0.85%	0.42%	0.09%
p-value	0.059	0.051	0.385	0.704
Annualized Sharpe Ratio	0.76	0.92	0.11	-0.47